1987-88

DEPARTMENT OF DEFENCE (NAVY OFFICE)





# REPORT

of the

# HYDROGRAPHIC SERVICE

## ROYAL AUSTRALIAN NAVY

for the year ended 30th June 1988








Issue Number 24

# REPORT

by the

Hydrographer, Royal Australian Navy

Commodore J. S. Compton, AM, R.A.N.

for the year ended

30th June, 1988

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## INTRODUCTION

This report briefly describes the activities of the Hydrographic Service, Royal Australian Navy. The Service comprises the Hydrographic Branch of the Navy as its headquarters with elements in Sydney and Canberra, ships and field units as the Marine Science Force based in Sydney, Cairns and Garden Island WA and the Naval Weather Centre at Nowra.

The function of the Hydrographic Service is to act as the National Hydrographic Authority and to provide:

* Environmental data including charting, oceanographic and meteorological products and services in support of the operational effectiveness of the maritime elements of the defence force; and
* Charting and related services for the safety of navigation of all ships servicing coastal and overseas trade.

During the year the more significant events have been:

* Establishment of a unified Lowest Astronomical Tide datum across the critical navigation area of the Prince of Wales Channel and its approaches in Torres Strait.
* Delivery and installation of a major data base system known as the Hydrographic Information System.
* Contract signing and commencement of construction by Eglo Engineering Ltd of four Australian designed Survey Motor Launches. These vessels constitute a new class of ship for the RAN and will be named PALUMA, MERMAID, SHEPPARTON and BENALLA.
* Commencement of tender evaluations for the procurement of the Australian designed Laser Airborne Depth Sounding System with the aim of achieving contract by the end of 1988.
* Government approval for the transfer of the bathymetric function and resources from the Department of Administrative Services to the Department of Defence to operate as part of the Hydrographic Service. Transfer will be formally effective from 1 July 1988.
* Near completion of a major structural and organisation change for the future management of the Service.

J S COMPTON
Commodore RAN
HYDROGRAPHER

# SECTION 1

# HYDROGRAPHIC SURVEY

## SURVEY OPERATIONS

### General

The Marine Science Force of the Royal Australian Navy consists of HMAS MORESBY based at HMAS STIRLING south of Fremantle, HMA Ships FLINDERS, BRUNEI and BETANO based in Cairns, and HMAS COOK based in Sydney. A small field unit for special survey tasks is based at the Hydrographic Office in North Sydney.

Details of the activities of individual units are given below.

Survey areas are shown in Figures 1 — 8.

### Ship and Unit Reports

#### HMAS MORESBY

MORESBY commenced a 6 month refit in July 1987, following two and a half years of surveying operations without an extended maintenance period. The venue was the Australian Shipbuilding Industries (ASI) shipyard at Coogee, 10 kilometres south of Fremantle. The ship was slipped on 14 July, becoming the largest ship to be slipped at ASI. The refit work package included an extensive hull refurbishment programme, main propulsion overhaul, diesel alternator overhauls, fit of a large capacity reverse osmosis water distilling plant and Survey Motor Boat (SMB) modification and overhaul. MORESBY was unslipped on 29 October after completion of the majority of the work package and returned to HMAS STIRILING on 27 November. Post refit trials and work up were conducted in November and December before the Christmas leave period.

The refit period also proved busy for the survey department. Post processing of the 1987 surveys of Ashmore Reef and South West Approaches to the Sahul Banks was completed and the surveys rendered to the Hydrographic Office. Detached surveys were undertaken at Esperance and Lancelin, and a survey of the approaches to the ASI slipway was completed. Preparations, including a helicopter supported reconnaissance, for the first survey of 1988, in the Barrow Island region of Western Australia, were commenced in October.

MORESBY sailed at the end of January for the survey of Mary Anne Passage, a restricted waterway between Barrow Island and the Australian mainland. The survey area includes the approaches to the extensive offshore shallow water oil fields of the region, and will provide full coverage of the approaches to these developments and their surrounding waters.

The ship returned to HMAS STIRLING on 26 March for a two week leave and Assisted Maintenance Period, and following this brief stay alongside, returned to Mary Anne Passage for a further eight weeks. For the majority of the survey MORESBY's SMBs were detached to Onslow and Airlie Island to progress sounding of the numerous shoal sections of the survey area. MORESBY returned to STIRLING on 3 June for a further maintenance period and will resume the Mary Anne Passage survey in July.

#### HMAS FLINDERS

HMAS FLINDERS had a diverse and interesting year, beginning with the successful completion of a major refit during July and August. The refit provided both a rest for the ships' company from extended periods at sea and much needed repairs and refurbishment to the ship's systems. Post refit trials and work-ups were conducted late in August. FLINDERS then sailed early in September to Torres Strait for a survey of the western approaches to Simpson Channel and Varzin Passage.

The aims of the survey were to ascertain the viability of Simpson Channel as an alternative to the Prince of Wales Channel, and to determine whether deeper water exists to the north of Gannet Passage in Varzin Passage. Gannet Passage is presently the only commercially significant western entry and exit for the passage through Torres Strait. For both defence and commerce, alternatives are highly desirable in this restricted and complex area. Accurate tidal information is crucial for deep draught shipping using Torres Strait and an extensive network of bottom mounted tide gauges was used in the survey. FLINDERS spent three months engaged in these tasks before returning to Cairns.

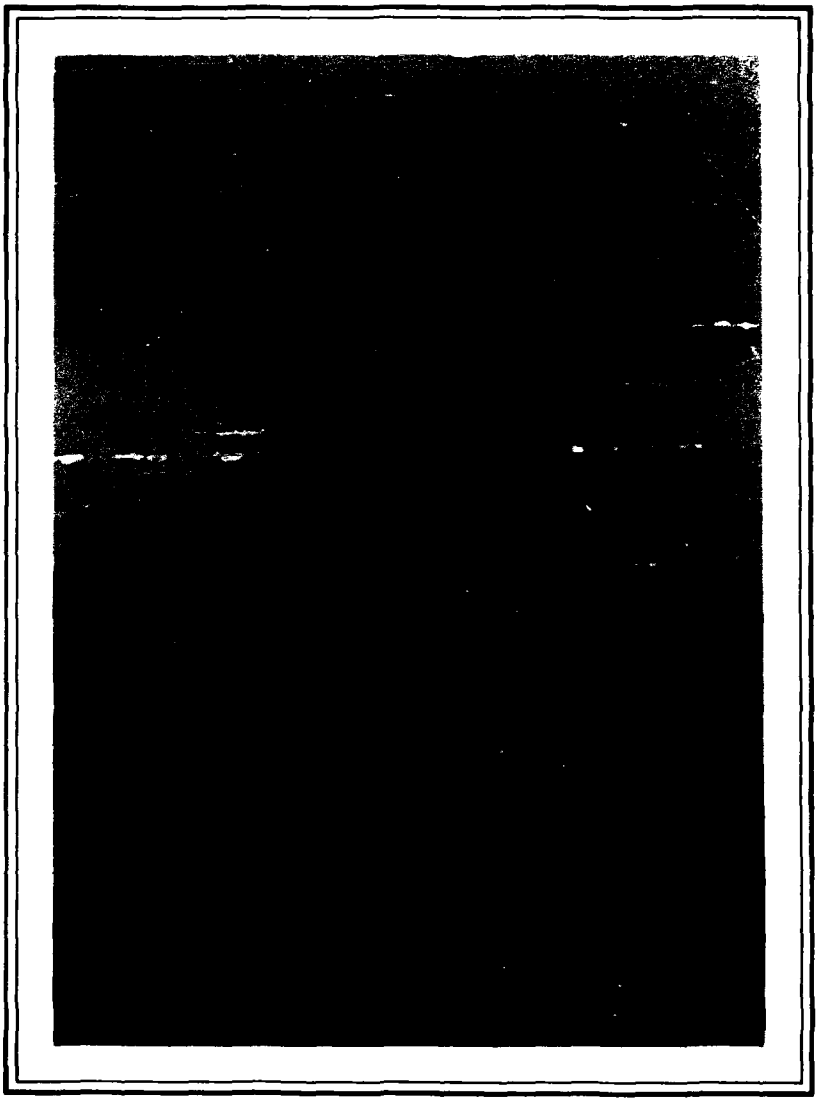
After spending an eight week period in Cairns over Christmas, FLINDERS sailed in February for an investigation of shoals in Connexion Channel at Groote Eylandt. She then returned to the Torres Strait area where extra work — mainly in the form of Side Scan Sonar investigations — was undertaken to support the results of the previous survey. During this time FLINDERS was diverted from her task to provide medical assistance to a Taiwanese fishing vessel. The work in Torres Strait was completed in mid April, and the ship returned to Cairns for a maintenance period and engine change.

FLINDERS sailed for Papua New Guinea waters in mid-May, to conduct a survey of coastal waters between Madang and Wewak under the Memorandum of Understanding between the governments of Australia and Papua New Guinea.

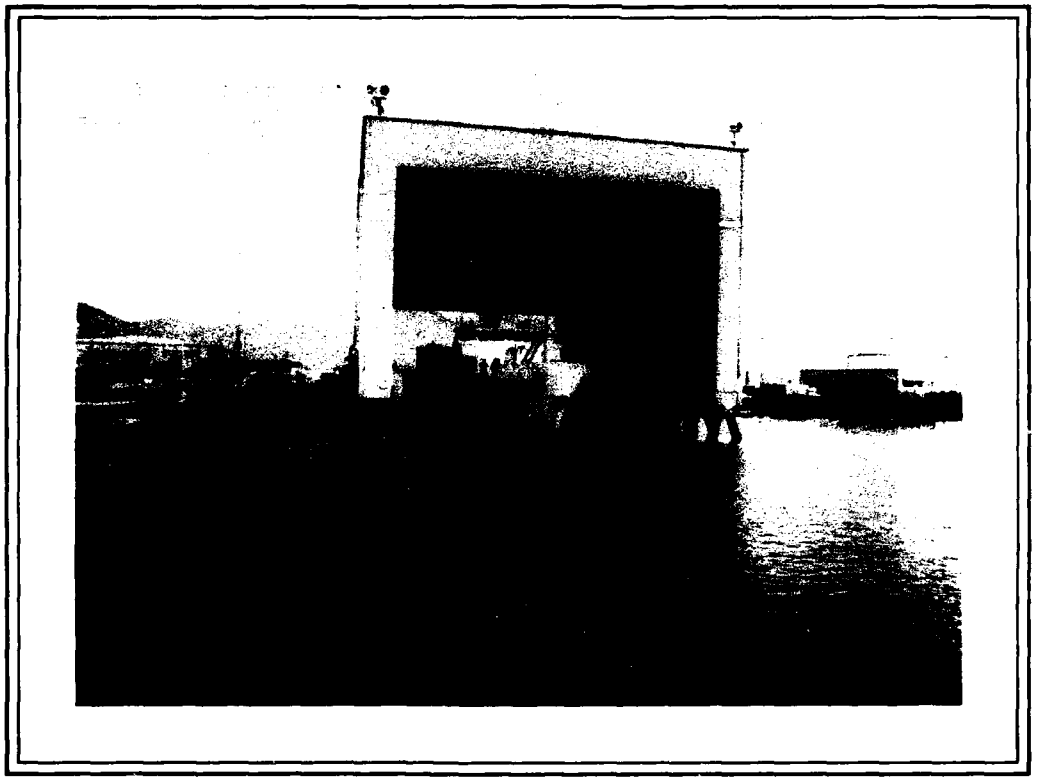
#### HMAS BETANO

From early August to late September BETANO was engaged in surveys in the Simpson Channel, at Brothers Patches, and in a reconnaissance for future surveys in the Claremont Isles. She returned to Cairns for docking in October and November.

The Claremont Isles survey was commenced at the end of November and completed in March, with a short break in Cairns for Christmas. This survey was followed by military tasking in April, and a short maintenance period in early May.



HMAS MORESBY IN DRY DOCK



HMAS FLINDERS UNDERGOING MAINTENANCE AT CAIRNS

BETANO sailed in mid May for a survey in Papua New Guinea waters, in company with HMAS FLINDERS. She returned to Cairns at the end of June.

### HMAS BRUNEI

BRUNE. was refitted by NQEA in Cairns until mid September. On completion of the refit BRUNEI carried out Work-Up training and participated in the amphibious exercise Diamond Dollar. From mid November to early December BRUNEI assisted FLINDERS with the survey of Nardana Patches.

After a leave and maintenance period over Christmas BRUNEI sailed in late January to assist BETANO in the completion of the Claremont Isles survey. This was finished in late February. During March the ship took part in exercise Initial Landing in Shoalwater Bay. A maintenance period followed, and in April BRUNEI participated in Plan Digest, taking army cargo from Cairns to Bamaga. On one trip a prefabricated platform was fitted in the historic navigation beacon on Raine Island, a structure built by convict labour in 1844. Its restoration is a recognised Bicentennial project.

BRUNEI visited Port Moresby in May and embarked the Papua New Guinea Hydrographer before establishing ARGO sites for the Wewak to Madang survey. Sites were initially established at the mouth of the Sepik River and on the volcanically active Vokeo and Bam Islands. Assistance obtained from local people enabled equipment to be deployed to somewhat unaccessible sites with ease. BRUNEI'S capability to beach close to most marks highlighted how successful the LCH has proved to be as an interim survey ship in the role of survey support. In May a 148 mile passage up the Sepik River was achieved. During the remainder of June BRUNEI continued to support FLINDERS with BETANO in this most interesting survey.

## Hydrographic Office Detached Survey Unit

From July to October the Detached Survey Unit was embarked in the Department of Transport vessel CAPE PILLAR for the annual offshore survey in the South West Pacific, sponsored by the Australian International Development Assistance Bureau and the Defence Co-operation Programme. The survey area for 1987 was in the Santa Cruz Islands, part of the eastern group of the Solomon Islands. One of the more interesting features of the work was that no systematic surveying had been carried out in the area since initial exploration in the last century.

The 1987/88 survey of the Antarctic Territory was to have covered the approaches to the Davis Base anchorage. The survey was cancelled prior to departure from Australia because of the stranding and loss of the NELLA DAN.

From January to March 1988 the Unit undertook a boat survey of Jervis Bay, the first full survey since 1894. This survey was also the first to be rendered to office in a digital form, having been logged and re-processed using the first of the new generation digital surveying systems being introduced into the Surveying Service.

The Unit embarked in the CAPE PILLAR on 13 June for a further 4 month period in the SW Pacific, this time in Vanuatu. This will be the third period that the ship has worked in Vanuatu's EEZ under the auspices of AIDAB and DCP.

## HMAS CAIRNS Hydrographic Support Unit

HMAS CAIRNS is the base for the Survey Ships FLINDERS, BRUNEI and BETANO, and the Hydrographic Support Unit was established to support these ships. Assistance provided includes equipment maintenance and support, and the preparation, compilation and rendering of survey data. Personnel are loaned to ships when required and permits for access to Aboriginal land are co-ordinated.

The unit also undertakes minor survey work in the Cairns area as required, and this year assisted in checking the new block correction for the Port of Cairns for chart Aus 262. An important liaison is maintained with the Cairns Port Authority and the Queensland Department of Geographic Information.

## Defence Co-operation Programme

Under the auspices of the Defence Co-operation Programme, Hydrographic Advisers have been seconded to the Governments of the Solomon Islands and Vanuatu. Both advisers are Chief Petty Officer Survey Recorders. The Solomon Islands Hydrographic Unit was established in 1980 and the Vanuatu Hydrographic Unit in 1987.

## RAN Adviser to the Solomon Islands Hydrographic Unit

During the latter half of 1987 the unit conducted two surveys. The first was undertaken to evaluate whether Ranadi Bay, East Honiara is suitable for the construction of a finger pier and mooring facilities for the discharge of petroleum and LPG. This survey was carried out in two stages, during August and October.

In September, with the assistance of the MV Cape Pillar, the unit conducted a survey at Luesala, Graciosa Bay, Santa Cruz Island, to locate a suitable berthing site for the export of freshwater to Nauru.

Delays in equipment repairs prevented surveys being carried out early in 1988 but this time was utilised carrying out much needed maintenance and repairs on the unit's boat and equipment. With the arrival of the Mini Ranger and Echo Sounder in May the unit is in the process of a 1:2500 survey of the selected mooring site for the petroleum and LPG depot at Ranadi Bay. This will be followed by a continuation of the 1:10000 survey of the Guadalcanal North Coast in June.

In December 1987 the Unit published chart SI24 Honiara Port 1:2500 and is currently progressing with SI12 Florida Islands & Siota Harbour. These charts are produced to International Standards and sold to the public through the "B" Class Chart Agency operated by the unit.

On Tuesday 10 May 1988, the Minister for Agriculture and Lands, the Hon. J. Tutua (MP) visited the unit and showed a great deal of interest in operations, both at sea and ashore.

The acquisition of a DCP funded dedicated survey boat is in hand. It will greatly enhance the unit's capability.

### RAN Adviser to the Vanuatu Hydrographic Unit

The RAN adviser to the Vanuatu Hydrographic Unit was appointed in March 1987. During the period covered by this report the Unit has been mainly engaged in initial establishment tasks. These activities have included identification and procurement of equipment, preparation of proposals for the acquisition of a survey launch, and training of personnel. Immediate surveying tasks have been identified, a survey programme has been prepared, and budget proposals have been lodged with the government.

Survey activities have been confined to the compilation and forwarding of survey data for Star Reef and some control surveys in Port Vila.

## SURVEY PLANS

### General

The RAN Surveying and Charting Plan is published in a five year rolling programme called Hydroscheme. The programme is developed through consultation with the Department of Defence, Maritime Authorities and Maritime Commercial Interests, and is revised annually. Hydroscheme 88, the plan for 1988-1992, was published in December 1987. The State of Surveys of the Australian coast is indicated on the diagram in Figure 9, which indicates the area surveyed by the RAN to modern specifications.

### Surveys Planned - July 1988 to July 1989

The following surveys are planned for the year 1988/89. The actual areas to be surveyed are shown in Figures 10 – 20.

**HI 129 Madang to Wewak;** (Scale 1:100 000) HMAS FLINDERS assisted by HMAS BRUNEI. Continuation of the 1988 survey due for completion August 1988. (Area 1 on Figure 10).

**HI 124 Thevenard Island to Barrow Island;** (Scale 1:50 000) HMAS MORESBY. Mary Anne Passage and Western approaches, due for completion in September 1988. (Area 2 on Figure 10).

**HI 132 Great North East Channel;** (Scale 1:50 000) HMAS FLINDERS September to October 1988. The survey concentrates on the Ackers Shoal area to provide a by-pass of Vigilant Channel. (Area 3 on Figure 10).

**HI 134 Gulf of Papua;** (Scale 1:50 000/1:100 000) HMAS FLINDERS November 1988. A large scale survey of the shipping approaches to the Fly River PNG. (Area 4 on Figure 10).

**HI 135 East Arnhem Land;** (Scale 1:50 000/1:100 000) HMAS MORESBY April 1989 to July 1989. An east to west survey of Arnhem Land waters from 11 Degrees south to the mainland. (Area 5 on Figure 10).

**HI 121 Claremont Isles to Heath Reef;** (Scale 1:25 000) HMAS BETANO August to September 1988. A continuation of the 1988 survey of the shipping route passing east of Heath Reef, completing the re-survey of the inner Barrier Reef route from Eden Reef to Heath Reef. (Area 6 on Figure 10).

**HI 137 Bee Reef to Endeavour Reef;** (Scale 1:25 000) HMAS BETANO September 1988. A large scale survey of the passage between Cairns Reef and the Hope Islands. (Area 7 on Figure 10).

**HI 130 Bass Strait;** (Scale 1:50 000) HMAS MORESBY October to November 1988. A survey of the shipping routes and adjacent waters between Wilsons Promontory and the Hogan Island group. (Area 8 on Figure 10).

**HI 120 Approaches to Davis, Antarctica;** (Scale 1:25 000) HODSU January to March 1988. A survey of the approaches to and anchorages at Davis. (Area 9 on Figure 10).

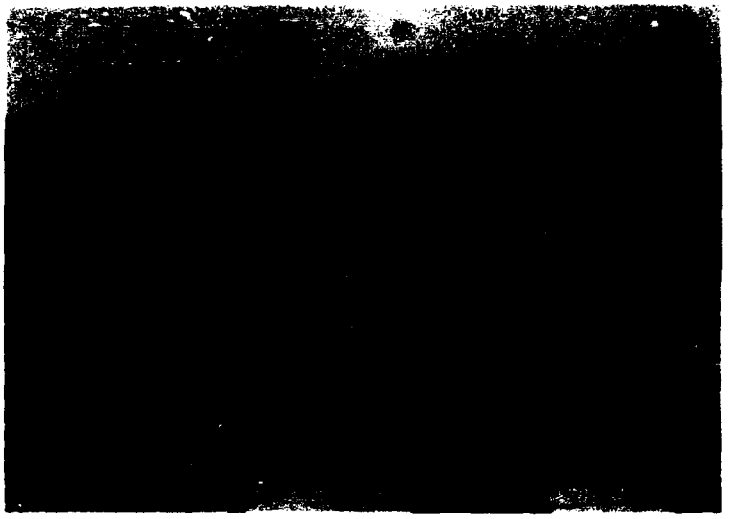
**HI 128 Vanuatu EEZ;** (Scale 1:250 000) HODSU from June 1988. A continuation of the 1988 survey. (Area 10 on Figure 10).

## SURVEY EQUIPMENT

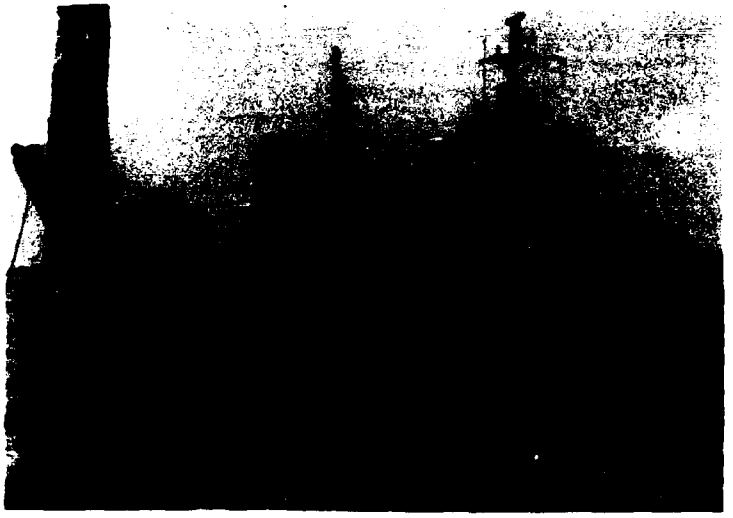
The Hydrographic Service has a continuous programme for the replacement of old equipment and the introduction of new capabilities. Equipment currently in service includes:

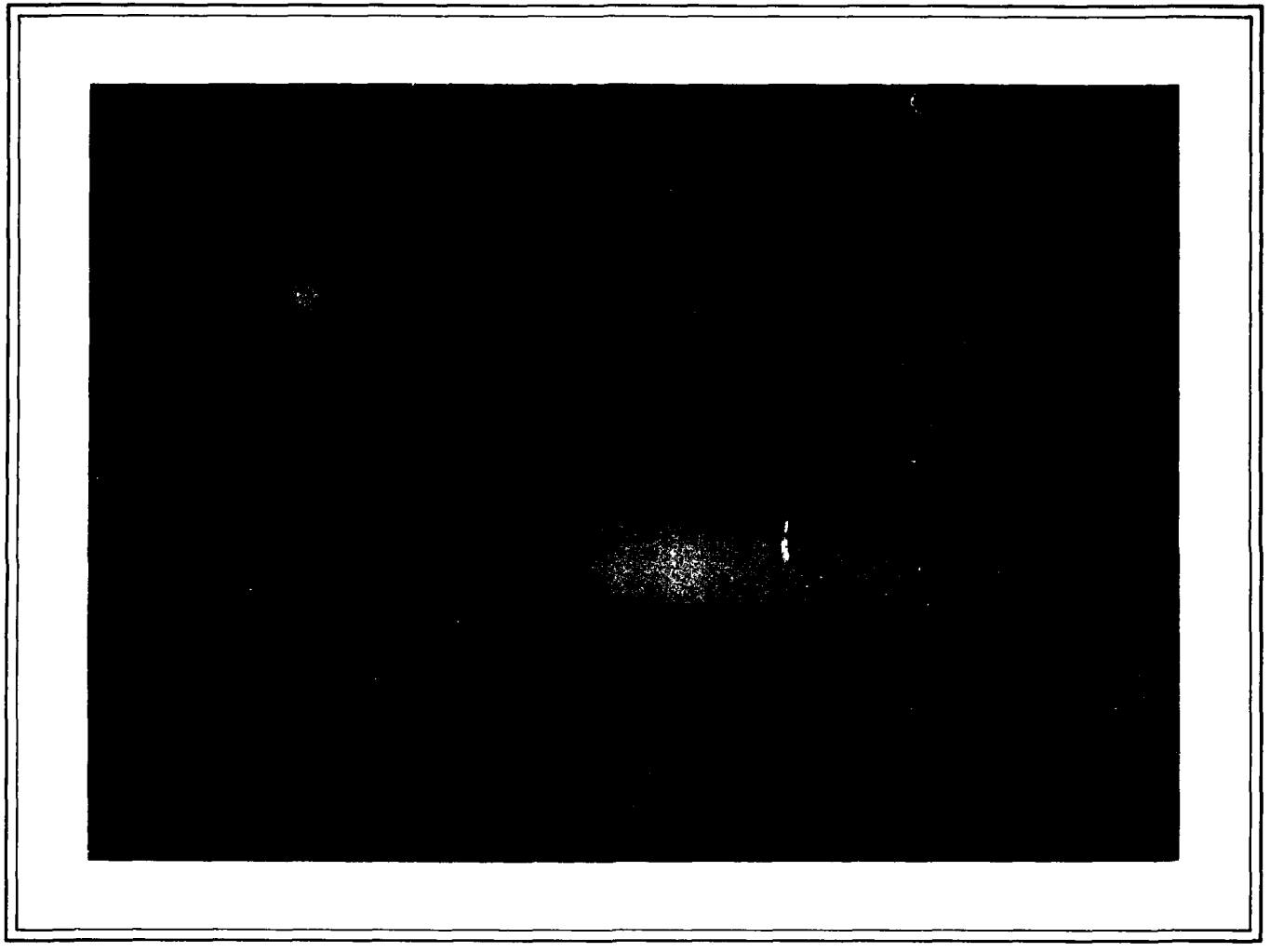
### Hydrographic Equipment

| | |
|---|---|
| Echo Sounders | Krupp Atlas AD20<br>Raytheon DE719<br>AN/UQN 4 |
| Sonars | Simrad Searchlight Sonar SU2<br>EG & G DCS3 Side Scan Sonar 259 MK 3 and 4 |



HMAS BRUNEI AT WORK IN PAPUA NEW GUINEA





CAPE PILLAR, CHARTERED FOR DCP SURVEYS
IN THE SW PACIFIC

| | |
|---|---|
| Navigation | Cubic Western ARGO DM54<br>Motorola Mini Ranger MRS3<br>Motorola Falcon IV<br>Magnavox 1102 |
| Tidal | Bristol-Elliott Tide Gauges<br>ONO Current Metres |
| Boats | 10m aluminium hull survey motor boats with water jet propulsion (3 MORESBY, 1 FLINDERS, 1 SCHOOL, 1 HODSU). 10m timber hull Survey Motor Boat (School). |
| Data Logging & Processing | Qubit Trac IV/Chart IV with HP Draftmaster Drum Plotter (HODSU only). |

### Land Survey Equipment

Principal land survey equipment in use includes:

| | |
|---|---|
| Theodolites | Wild T2 |
| Levels | Wild/Nikkon/Fuji Automatic levels |
| EDM | Tellurometer MRA7<br>Sokkisha Red L2<br>Wild Distomat |
| Geoceiver | Magnavox MX1502 |

## NEW EQUIPMENT PROJECTS

### Medium Hydrographic Ships

The project to provide three medium hydrographic ships (MHS) is progressing through the Department of Defence committee system. It is proposed to introduce these vessels into service in the period 1993 to 1995.

### Survey Motor Launches

In November 1987 a contract was signed with Eglo Engineering of Adelaide, South Australia for the building of four catamaran hulled vessels based upon the Prince class of Ro-Ro passenger ferries. The vessels incorporate the "Hydrodome" hull form developed by the Australian Marine Consulting and Design group, ASD Marine Pty Ltd. The Hydrodome design has produced good sea keeping results for a number of operators on the Australian coast. It will be well suited for carrying out hydrographic surveys, and is able to undertake ocean passages.

The principal features of the vessels are:

| | |
|---|---|
| Length | 36.7 Metres OA (34.9 WL) |
| Beam | 13.7 Metres |
| Draught | 1.9 Metres |
| Speed | 12 Knots |
| Endurance | 14 Days |
| Propulsion | Twin Detroit GM92TA Diesels |
| Crew | 12 |

Construction is to Lloyds Classification +100A1 LMC UMS, and the Uniform Shipping Laws Code Class 2A. The propulsion arrangements are conventional direct drive to fixed pitch propellors. A high standard of accommodation is provided. This is particularly necessary as the vessels will be deployed away from base for up to three months at a time in remote tropical areas.

The crew of 12 includes two surveying officers, four seamen/survey recorders, four engineers/technicians, a radio operator and a cook. In order to provide the required level of technical expertise the ships will operate in pairs and members of crew will be interchangeable. For example, one vessel of a pair will have a senior mechanical engineer, while the other will have a senior electrical engineer. This pooling of expertise is important for operations in very remote localities.

The four ships will be based in Cairns. They will mainly operate on the north coast of Australia from Exmouth to Darwin, across to Torres Strait and down the east coast as far as Brisbane. They will also conduct surveys in Papua New Guinea, and will be able to work in co-operative programmes in other areas of the South-West Pacific as the need arises.

The vessels will be named after ships employed in surveying on the Australian coast in earlier times. The names will be PALUMA, MERMAID, SHEPPARTON and BENALLA. They will be delivered between November 1988 and October 1989.

## The Laser Airborne Depth Sounder (LADS) Project

Following a detailed revision of costing, the Laser Airborne Depth Sounder (LADS) project was approved by the Government in September 1987. A Request For Tender (RFT) was released to a previously agreed short list of 12 potential prime contractors, all Australian, in mid November 1987. Tenders closed on 25 May 1988, with four bids comprising consortia representing most of the potential primes. A contract to construct and trial the LADS System is expected to be awarded before the end of 1988. Although it is likely that this contractor will also provide logistic support, including pilots and maintenance personnel during operations, the Commonwealth has the option to call new tenders for the operations phase at the close of trials. LADS now has a three year programme ahead before operational service. This consists of an eighteen month building phase, followed by an equal period of trials designed to achieve optimum system performance, prior to Navy acceptance trials. LADS is now expected to be in service in the second half of 1991.

## Hydrographic Data Logging and Processing Systems (HYDLAPS)

A $6.5m contract was awarded to QUBIT Pty Ltd of Fremantle WA in January 1988 for the supply of several HYDLAPS systems to the RAN. The systems to be acquired will provide the following vessels and establishments with a data logging and processing capability:

### Ships Systems

- HMAS MORESBY
- HMAS FLINDERS

### Launch Systems

- HMAS PALUMA
- HMAS MERMAID
- HMAS SHEPPARTON
- HMAS BENALLA

### Survey Motor Boat Systems

- MORESBY (4)
- FLINDERS (2)
- RAN Hydrographic School (1)

One full ship system is to be installed at the Hydrographic Office, North Sydney, for training, office processing and system management.

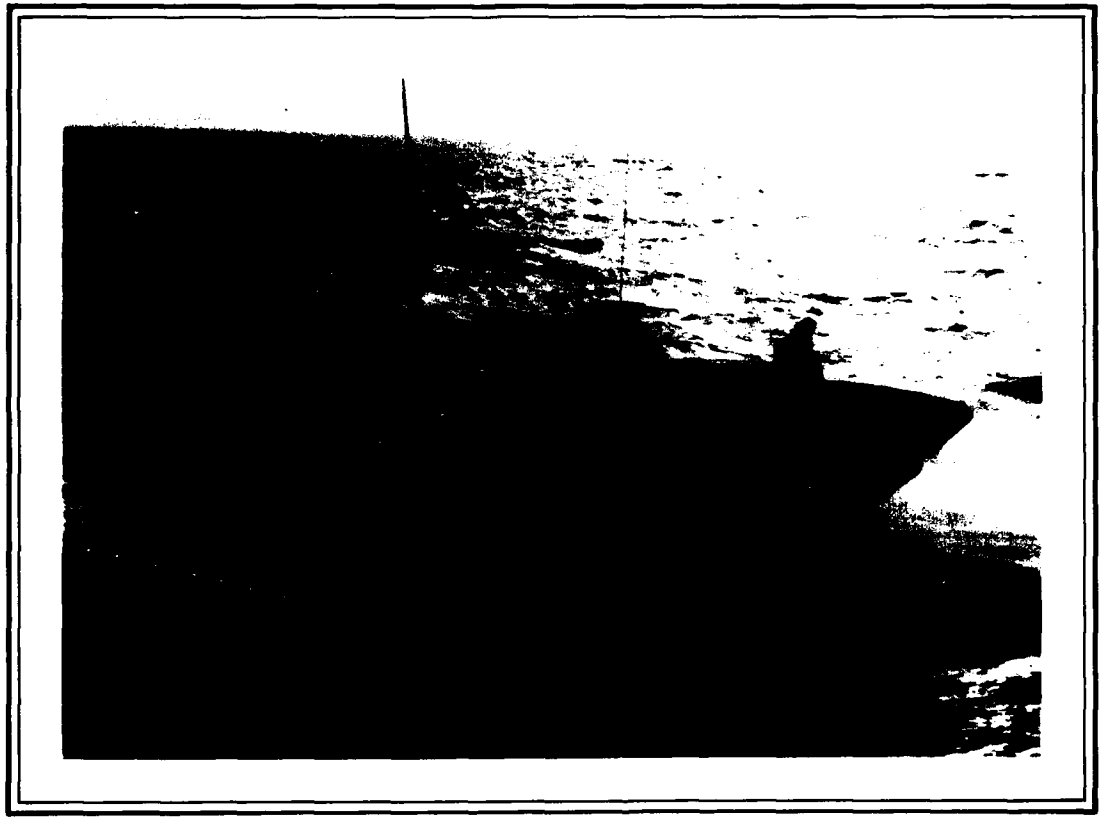
All systems are programmed to be installed over the next twelve months. The systems are based upon the Qubit Trac V/Chart V Data Logging and Processing Systems, with additional peripherals appropriate to the vessel in which the system is installed.

## Minor Projects — General

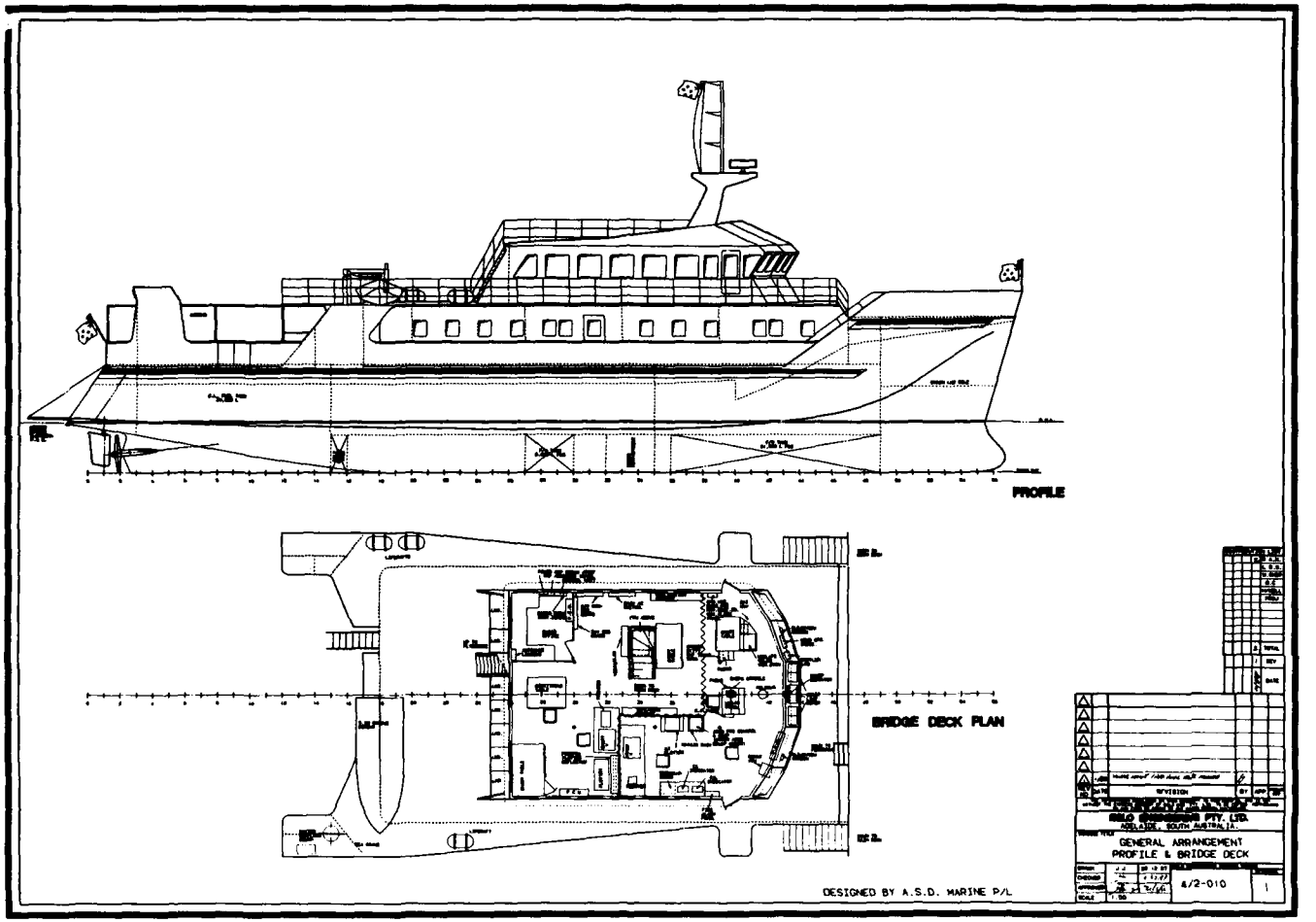
Other specialist hydrographic survey equipment acquired during the period included doppler logs and Simrad sonar colour recording consoles for MORESBY, FLINDERS and COOK.

A number of other projects are in various stages of development and include:

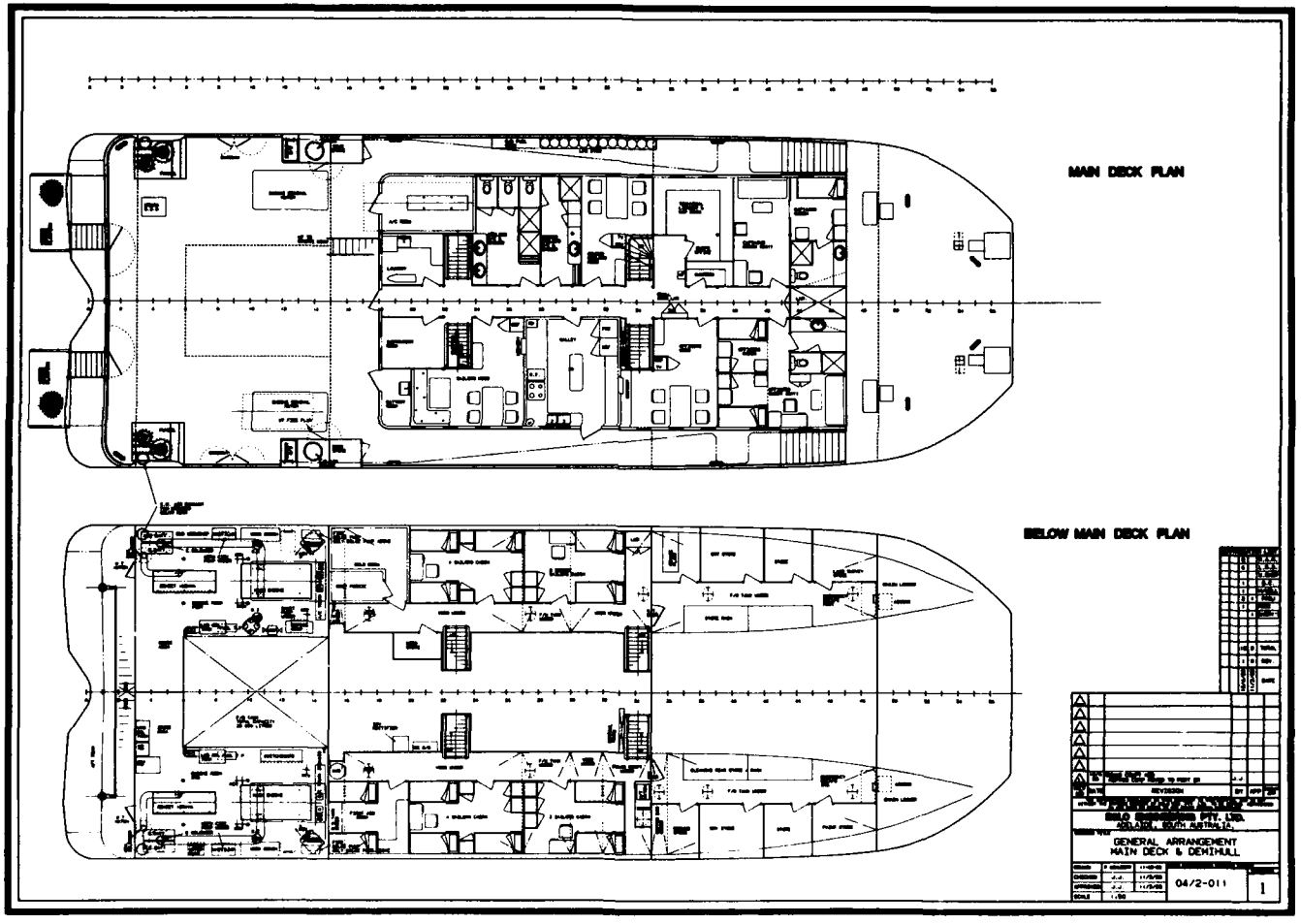
- Survey Motor Boats Replacement
- Tide Gauges and Current Meters Replacement
- Remotely Operated Vehicles
- HYDLAPS Data Management System
- G.P.S.
- HP85 Replacement



A SURVEY MOTOR BOAT IN HER ELEMENT




PLAN OF THE NEW SURVEY MOTOR LAUNCHES




PLAN OF THE NEW SURVEY MOTOR LAUNCHES

# SECTION 2

# NAUTICAL CHARTING

## CHART PRODUCTION AND MAINTENANCE

Australian charting activity involves the integration of all maritime surveys in the area of Australian Charting responsibility (see Figure 21). Vessels operating from Australian ports are required by the Navigation Act to carry charts. Australian charts form part of an integrated world wide coverage of standardised navigation products provided for the international mariner.

The careful management of maritime survey information is critical to the production of new charts and also to the revision and maintenance of existing charts. Information is primarily supplied from the field activities of the RAN Marine Science Force and the members of the Association of Australian Port and Marine Authorities. Other information is supplied by Commonwealth and State authorities, international sources,the private sector, and the general chart user. The variety of sources of information and the fact that much of the information has originated outside the Hydrographer's control requires considerable co-ordination and a continuous revision of production priorities so that salient information can be provided to the mariner in a timely manner.

The receipt of hydrographic information affecting charts continues at a high level with 755 hydrographic source documents being received for the year. This does not include other information which affects charting such as geodetic data, topographic mapping and satellite information. Chart production generally is higher than last year and includes the compilation of some 52 separate chartlets and Notices to Mariners 'blocks'. This is indicative of the quantity and diverse geographic distribution of information received.

Considerable progress has been achieved in chart production programmes during the year. Of particular note is the complete revision of charting for Port Hedland and the Port of Dampier in support of the continuing development of these ports. A major revision of the tidal datum in the Torres Strait, and additional survey activity, has required the complete revision and production of 5 charts in that area. A summary of chart production activity is contained in Appendix 2.

The maintenance of the navigation chart is a continuous process of review, utilising various methods agreed under international arrangements. The method chosen depends upon the effect of the new information on existing charts and can involve the complete redesign, compilation and production of charts. The more complex revisions are usually dealt with by providing new charts or new editions, while more urgent new information is promulgated through Notices to Mariners, revised print corrections or the less complicated revised editions. The objective of the chart maintenance program is to maintain a supply of charts available for distribution in the most up-to-date condition possible. The chart maintenance programme is a crucial component of Branch activity which has seen most charts revised and reprinted at least once throughout the year. Some were reprinted up to 5 times in the year. Chart maintenance activity is also summarised in Appendix 2.

The updating of chart stock by regular over-printing of Notice to Mariners alterations is achieved using screen printing processes. During the year this facility has been modernised and re-activated. A new semi-automated screen printing machine has been installed and general facilities have been improved. Subject to continuous staffing and increased drying space, it is anticipated that this facility will have significant impact on the printing programme and enable more frequent correction of chart stocks.

Printing of new charts, and new editions, and re-printing for stock replenishment is done by the Royal Australian Survey Corps at their Bendigo facility. Printing statistics are shown in Appendix 2.

System aided production on the Autochart system stabilised during November/December after considerable disruption due to the modernisation of accommodation. New overhead gantry housing for the interactive graphics screens has improved ergonomic conditions. The production capability of the system is currently limited by a shortage of interactive graphics screens, and the age of the equipment does not now allow significant improvement in user interaction facilities. The appointment of a full time system operations manager has improved the user interface to the equipment and facilitates the integration of revised international standards and symbology as they arise.

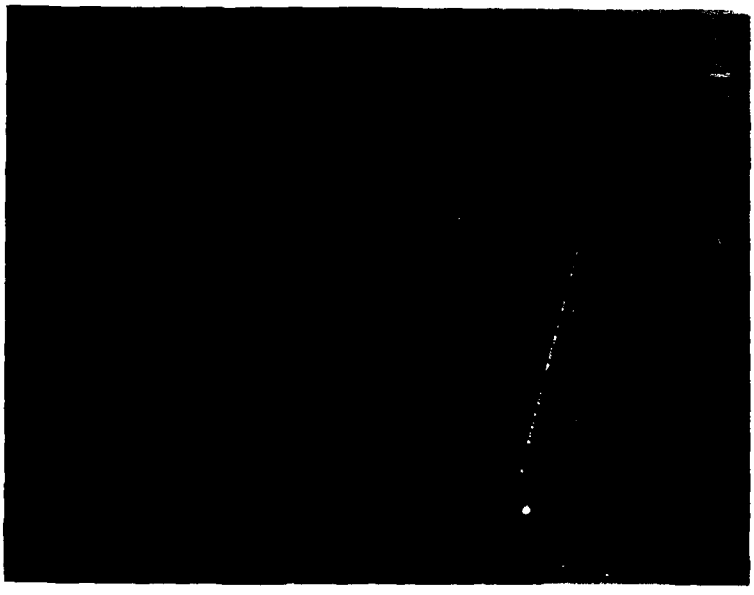
The growing volume of information available in digital form has proved difficult to exploit. Information densities, and other characteristics arising from the purpose for which the information was captured, have consistently led to difficulties in utilising such data for digital charting. Digital data exchange standards, generally, have proved difficult to use effectively, and the costs of utilising data provided through exchange standards is presently much higher than re-digitising selected information in-house.

Current trends towards the supply of information in digital form, together with the chart production methodology in use, place emphasis on creating a digital information environment. This need is reinforced by developments in the electronic chart and maritime information control systems. Thus the requirement for information supply in digital form will be of growing importance.

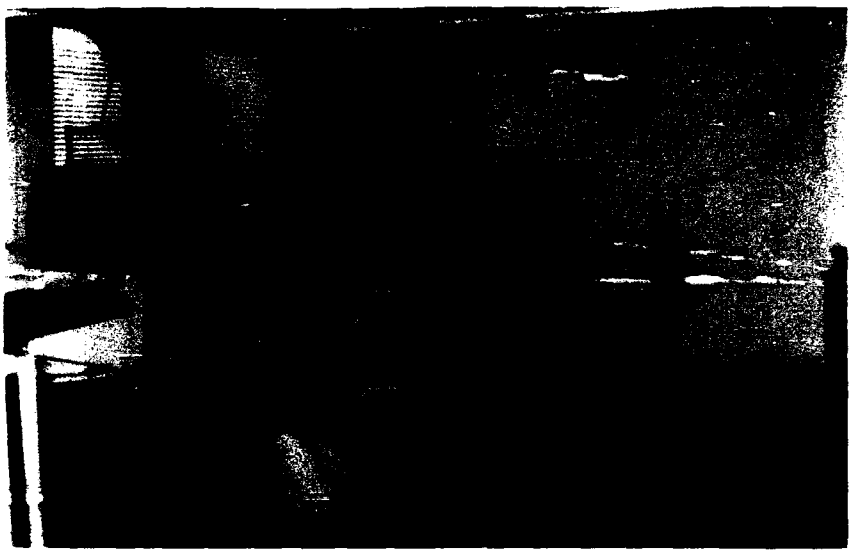
Continued use has been made of satellite imagery in improving the delineation and placement of reefs and offshore islands in poorly surveyed waters. The use of depth of penetration image analysis has generally not provided satisfactory results with the exception of some waters in the Great Barrier Reef. More research is required into the use of this information source.

Close co-operation has been maintained with other charting authorities throughout the Australasian and Pacific Ocean regions. This has involved the re-scheming of a proposed series of international charts at medium and large scales (the Area Lima series). The series is part of an impending international arrangement sponsored by the International Hydrographic Organisation (IHO), and re-scheming involves discussion and co-ordination with adjacent regional co-ordinators (Japan, UK, USA, Chile, India) and national producers (Indonesia, New Zealand, France, United Kingdom, Solomon Islands, Fiji). Continuing dialogue and discussion is also undertaken through various international charting arrangements. The international alignment of standards and specifications is a continuous activity co-ordinated through the IHO.

THE SCREEN PRINTERY



FAIR DRAWING SECTION



AUTOMATED CHART PRODUCTION AREA

KONGSBERG FLATBED PLOTTER

## CHART DISTRIBUTION AND SALES

The 1987/88 year has been a comparatively stable year for the Chart Distribution Centre. The staff levels have been steady for most of the year and this has resulted in the more reliable and responsive service that has been offered to customers.

The chart agency network has decreased by three. Three new agents have been appointed, and six agencies have been withdrawn. There are now 78 agents in Australia and 12 overseas.

During the year the revenue from sales of charts has increased, mainly reflecting increased prices. There has been a trend downwards in volume, particularly in the British Admiralty products which are increasingly being sold through the other British Admiralty chart agents around Australia. The sales value of these products has remained much the same due to increased price. There has been an increase in issues, reflecting the Navy's greater use of charts of foreign waters. More details of the Distribution Centre's turnover can be found at Appendix 4.

## INFORMATION SERVICES

The Hydrographic Office Records and Library section provides a specialised service covering hydrographic and oceanographic activities within Australian states and territories, and overseas.

During the year 1987-88 survey sheets were received from the RAN Survey Units and from other sources listed in Appendix 3.

## TIDAL AND NAVIGATION SERVICES

### Tidal Section

The Section's work includes production of Australian National Tide Tables (ANTT), and support for cartographic work, survey operations, and special projects.

The 1989 edition of ANTT has been compiled and will include tidal height predictions for 76 standard ports and one entry for predicted tidal streams. These predictions were produced by Flinders Institute for Atmospheric and Marine Sciences (FIAMS) (streams and 58 ports), Commonwealth Scientific and Industrial Research Organisation (CSIRO) (4 ports), Department of Marine and Harbours W.A. (4 ports), Hydrographer of the Navy (UK) (3 ports), Proudman Oceanographic Laboratory (Bidston, UK) (2 ports), Associated Surveys International (1 port) and the RAN Hydrographic Office (4 ports).

The Australian Government Printing Service continues to be the commercial marketing authority for the ANTT.

The supply of hydrographic survey datum adjustments to the cartographic section of the Office is still the most time consuming task. New editions of the older charts require datum conversion to the Lowest Astronomical Tide (LAT) and the increasing production of new charts puts additional demands on the Section. As RAN surveys venture further and further afield, they need reliable tidal models which are difficult to compile because of a scarcity of data. The survey returns increase the tidal data base but at present it cannot be fully developed due to a staff shortage. Once completed, it will facilitate all aspects of the Section's work.

The Section has adapted all its major programs to a new computer system and has achieved a large step forward in datum rationalisation. All the large scale charts for Torres Strait and the relevant tidal predictions (Booby Island, Goods Island, Turtle Head, Thursday Island, Ince Point and Twin Island) will be referred to LAT from the date of publication of the 1989 edition of ANTT. LAT is now the chart datum for the Australian area of responsibility and the work towards its full implementation is progressing. The only exceptions will be a few micro-tidal ports where the atmospheric influences can overwhelm the tides, resulting in water levels below LAT.

The imminent arrival of HYDLAPS and the Survey Motor Launches will put an additional workload on the Section. The tidal records system is being streamlined and the database redesigned to accommodate the expected increased flow of mostly digital data.

The Tidal Section usually has a staff of three but was under strength for most of the year. The Tidal Officer's position remained vacant from October until February and the Technical Assistant's position from March onwards.

### Notices to Mariners

The section has continued to receive a steady flow of data, with 694 Notices issued during the year.

The section's personal computer has been optimised to produce an ever increasing data base of files and annual documents. The Australian content of the Weekly Edition is transferred to the printer via magnetic media.

Statistics for the period are as follows (1986/7 figures in brackets):

| | | |
|---|---|---|
| Notices to Mariners issued | 694 | (581) |
| Blocks for Charts | 41 | (32) |
| Notes/Cautions for Charts | 52 | (44) |
| Hydrographic Notes from HMA Ships | 94 | (82) |
| Hydrographic Notes from other sources | 92 | (89) |

Vessels rendering 5 or more Hydrographic Notes during the year were:

| | |
|---|---|
| HMAS BRUNEI | 5 |
| MV CAPE MORETON | 6 |
| MV CAPE PILLAR | 20 |
| MV FIJI GAS | 8 |
| HMAS GERALDTON | 7 |
| HMAS GLADSTONE | 7 |
| HMAS MORESBY | 12 |
| MV NIMOS | 6 |
| MV PACIFIC TRADER | 5 |
| HMAS TORRENS | 9 |
| HMAS TOWNSVILLE | 9 |
| HMAS WOLLONGONG | 7 |
| STS YOUNG ENDEAVOUR | 5 |

### Sailing Directions

The Sailing Directions Officer has been mainly concerned this year with nomenclature matters. Two aspects are dealt with: research for Office purposes into names to be used on charts, and responses to enquiries from the public. There has been a steady increase in nomenclature questions over the years, reflecting increased offshore mapping activity, the formation of state geographical names boards, and an increasing popular awareness of the importance of names. As an example, the new chart of Thursday Island (Aus 299) had 42 nomenclature queries requiring resolution. 550 questions from nomenclature authorities and the public were answered during the year. New or altered names that have been assigned by State or Commonwealth nomenclature authorities have been incorporated in the relevant charts.

## SYSTEM SUPPORT

### Autochart

The Autochart system, having been installed initially in 1979 and having worked continuously since then, is beginning to show signs of age. The initial planned 'life of system' of 10 years will be prolonged marginally through the acquisition of second-hand equipment redundant to the needs of other Commonwealth Departments. Plans are in hand to achieve system replacement within three years.

Software development during the year has been confined to the inclusion of some new commands and the rationalisation of all programmes to run on all sub-systems. User maintenance has seen the expansion of available symbology to the point where the goal of achieving full charting symbology is practically met. Considerable effort has been expended to achieve compatibility from contracted digitising of charts. This will remain a key activity for the immediate future.

### Hydrographic Information System

Disappointingly there have been delays in the delivery of the Hydrographic Information System and acceptance testing, due to commence in late May 1988, has been delayed until October 1988. Final equipment delivery took place in mid May 1988. Branch staff have had the opportunity to work on the GeoVision core product release 3.1 since November 1987 and, as a result of their experience, were able to provide valuable feedback into the development process. A member of the Hydrographic Information System project team travelled to Ottawa to provide input to the planned GeoVision 4.1 core product release, which will benefit the Hydrographic Information System.

### Strategic Planning for ADP Support

A number of pressures are being felt by the Branch in respect of ADP planning. Primarily, the impact of technology on data collection and processing must be addressed in terms of information management. It is expected that consultants will be engaged to conduct the initial phase of an information study during the next financial year. The integration of data collection and processing systems to production methodologies is being addressed, and the foundations of a national hydrographic ADP strategy are being laid.

It is expected that the full development of the ADP Strategic Plan will take between two and three years. The development of a comprehensive ADP philosophy must recognise the realities of system acquisition lead-times, the difficulty of attracting and keeping competent computer professionals, and the complexity and scale of the hydrographic task. The plan will lay the groundwork for geographic information systems, information management and technology, production graphics systems, and administrative and marketing computer support. Integration will be achieved through the implementation of disciplined programme management facilitated by the revised organisation structure. In this organisation the strategic importance of information and its support through an appropriate ADP strategy is properly recognised in relation to overall Branch objectives.

Major activities in the System Support Group in 1988/89 will include:

* Completion of interactive editing capability for AUTOCHART.
* Consolidation and enhancement of the Hydrographic Information System (HIS).
* Information management and data-base systems.
* AUTOCHART replacement project.
* HMAS COOK data-logger replacement project.
* Office networking and HYDROSTOK replacement.
* Delivery of the HYDROCOMP system to the Australian Oceanographic Data Centre (expected during Financial Year 88/89).

# SECTION 3

# OCEANOGRAPHY AND METEOROLOGY

# OCEANOGRAPHY AND METEOROLOGY

## General

The Hydrographer is responsible for the development of Oceanography and Meteorology in the RAN. The principal centres of activity are the Oceanographic Ship HMAS COOK, the Science and Oceanography section of the Hydrographic Office in North Sydney (incorporating the Australian Oceanographic Data Centre), and the Naval Weather Centre at Naval Air Station Nowra.

# SHIP REPORT — HMAS COOK

HMAS COOK has enjoyed an extremely busy and highly successful 1987/88 which has included two major oceanographic deployments, a total of six research operations, one seamount survey, a major refit and the role of review ship for the Australia Day Bicentennial celebrations.

## Research Operations

From July to September 1987 the ship was operating in the South-West Pacific region continuing her SEAMAP investigations. This work involved an extensive array of physical observations along the Australian, New Zealand and Samoan shipping routes during oceanic winter.

Task MSD 2/87 – 'a study of acoustic bottom interaction, investigation of bubble patterns and measurement of the Tasman Front', was undertaken during November. This operation involved the trialing of Acoustic Deep Ocean Bottom Equipment (ADOBE) used to assess bottom structure and its impact on sonar performance.

In December COOK completed HI 123, a basic survey of Taupo Seamount, in company with HMAS GEELONG.

In February 1988 the ship embarked upon a ten week deployment which involved four major operations completed for three separate organisations. The work included:

* A comprehensive geological investigation of the Woodlark Basin, Papua New Guinea, for the CSIRO and the UN.
* A variety of experiments in the Torres Strait aimed at assessing the impact of bottom movement and sound propagation on mining and mine clearance (in company with HMA Ships BENDIGO and LAUNCESTON) for MSD Sydney, formerly RANRL.
* Extensive SNBESS profiling, bottom sampling and seismic surveying in the Cato Trough in the Coral Sea to identify deep water currents in the region, for the University of Sydney.

## Other Events

Oil leaks from the active rudder, excessive wear in shaft bearings and fracturing of the SNBESS fibreglass housing necessitated unscheduled dockings in October and January. In April the 1988 refit commenced. The major items to be undertaken include improvements to the main winches, overhaul of the bow thruster, planned maintenance on generators, repairs to both propeller shafts, some tank preservation, and software upgrading for the computer systems.

The ship once again tripped across the world stage when Their Royal Highnesses the Prince and Princess of Wales reviewed the Tall Ships Parade of Sail in COOK on Australia Day.

The year has arguably been the most productive in the ships eight year history (25,699 nm steamed with 2920 hours spent underway). COOK's technical state is better now than perhaps it ever has been and continues to improve. Some exciting international research projects are planned for the near future and, of course, another role as review ship late in 1988.

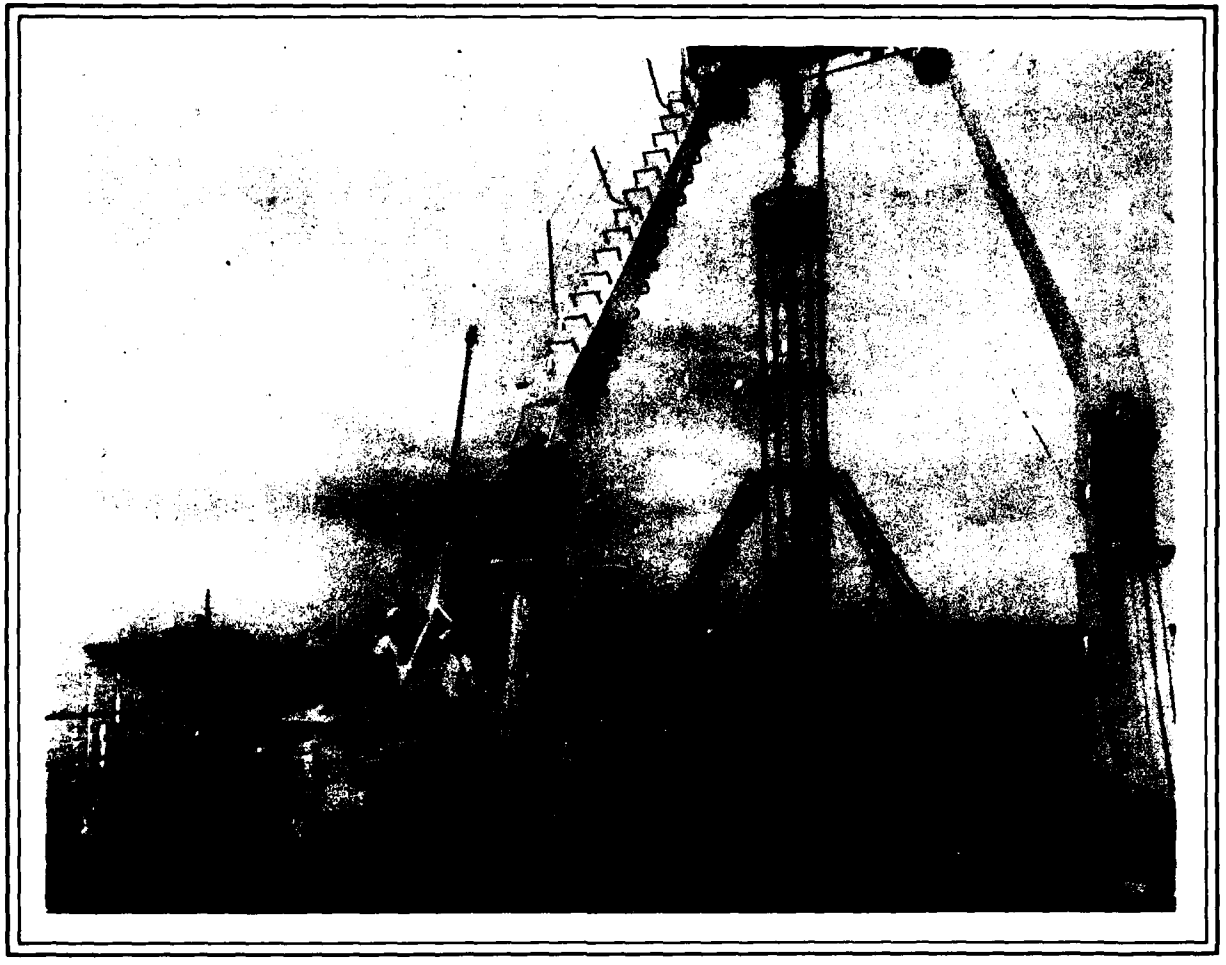
# AUSTRALIAN OCEANOGRAPHIC DATA CENTRE

Within the Hydrographic Service the AODC is responsible for the acquisition, quality control and archiving of oceanographic data, and the dissemination of information to the Australian Defence Force and the civilian community.

## Bathythermal Data

The AODC has continued to acquire Expendable Bathythermograph (XBT) data from the RAN and this year has received 2,362 XBT observations from the waters surrounding Australia. Almost 300 of these observations were collected by HMAS MORESBY using the new MK 9 digital XBT recorder. These data are stored on cassette tape and must be processed using digital quality control techniques. At the present time these cassettes are being forwarded for quality controlling to the United States National Oceanographic Data Centre (NODC) where computer facilities are available to perform automated checks.

A further 3,606 analogue XBT traces from both the RAN and RNZN were forwarded to the US NODC to be converted into digital form and 8,730 digitised observations were returned to AODC on magnetic tape for future inclusion in the National Bathythermal Data Bank.



VIBROCORER DEPLOYMENT ON THE QUARTERDECK
OF HMAS COOK

In recent months AODC personnel have been assisting the CSIRO, Division of Oceanography, which manages the "XBT Ship of Opportunity Program" as part of the Tropical Ocean Global Atmosphere (TOGA) program. AODC personnel visit participating ships berthing in Sydney and collect the data from their XBT system, re-initialise their satellite transmitter and assist with any simple problems. The CSIRO are collecting several thousand XBT observations each year and have made this digital data available to AODC. Three ships, the ANRO ASIA, ANRO AUSTRALIA and the NIMOS are currently being supported in Sydney.

## Services

The AODC has continued to provide environmental data and information to ADF maritime units on a regular and ad hoc basis this year. Three major briefs were supplied for ship deployments and exercises. These briefs reviewed oceanographic and meteorological conditions relevant to naval operations within specific areas of interest.

Ad hoc reports have been provided to various Naval and Defence establishments detailing oceanographic parameters in specific regions around Australia. Much of the requested data is available from Nansen Casts, digitised on magnetic tape, but a lack of computing facilities has meant that the material provided was extracted from a limited quantity of published reports.

An initiative to produce 'stand alone' regional environmental briefs for waters of direct military interest to Australia was begun in late 1987. The project is being sponsored jointly by the AODC and the Applied Oceanography Centre (AOC), located within the Australian Joint Maritime Warfare Centre (AJMWC), Nowra. The briefs are intended to provide Australian Defence Force Units with a comprehensive summary of the operating environment in the region. The AODC will be responsible for providing much of the oceanographic content as well as co-ordinating the presentation and publication of the booklets. The progress and successful completion of this project is dependent on the availability of manpower.

In its capacity as a National Agency the AODC has supplied information in the form of reports and raw data to a wide cross-section of the civilian community. A number of requests requiring research effort were received from various organisations including:

* Krupp (Australia) Pty Ltd. (New submarine project).
* Elders Financial Group (Resort development).
* Sydney University (Research).
* Australian Museum (Research).

## Training

Familiarisation visits to AODC by Navy personnel have continued and courses on the correct operation and maintenance of XBT equipment were held several times during the year. Visits to AODC were arranged for Underwater Control specialists from various Fleet units and those attending training courses at HMAS WATSON.

## AODC International Activities

The AODC has continued it's involvement with the Intergovernmental Oceanographic Commission (IOC) as a result of the Hydrographer's responsibility as the National Co-ordinator for the International Oceanographic Data Exchange (IODE) program and as the National Representative of the Integrated Global Ocean Services System (IGOSS).

## IGOSS

Efforts have been made to establish a mechanism allowing the quality control of data obtained in real-time by Australian coastal radio stations. This data will be checked and, if necessary, edited by AODC personnel before it is included on the World Meteorological Organisation's (WMO) Global Telecommunications System (GTS). While many of the resources and methodologies necessary to accomplish this task are in existance, the lack of a computer facility is delaying the implementation of this capability.

Efforts are still underway to form a Specialised Oceanographic Centre (SOC) for the Indian and South Pacific Oceans as a joint venture with the Bureau of Meteorology. The exact area of interest has now been determined, with the establishment of the SOC dependent on the implementation of the HYDROCOMP computer system.

## IODE

The AODC is the national focal point for the IODE program. A major activity of this program is the exchange of Australian sourced data with both the Responsible National Oceanographic Data Centre for the West Pacific region (RNODC-WESTPAC) and the World Data Centre for Oceanography. This year only a limited quantity of data from the RAN has been forwarded to WDC under this obligation and no data has been forwarded to RNODC-WESTPAC. A large quantity of data is available in Australia, particularly from the CSIRO's research vessel FRANKLIN.

## International Meetings

In January, 1988 the Officer-in-Charge, AODC attended the Second Session of the Joint IOC/WMO Meeting of Experts on IGOSS/IODE Data Flow, hosted by the Marine Environmental Data Service in Ottawa, Canada. The meeting examined ways of improving data flow within the existing oceanographic programs and made recommendations as to methods of improving data management to assist international research programs such as TOGA and WOCE. The Officer-in-

Charge, AODC proposed a large scale project to develop a standard global data base of ocean temperature information using new technologies such as the CD-ROM. This project received the support of the meeting.

In May, 1988 the Officer-in-Charge, AODC, as a consultant for the IOC, attended a meeting of the organising committee for the IOC/UNESCO Training Course on the Use of Micro-Computers in Oceanographic Data Management. The meeting was held at the headquarters of the Thailand National Research Council and arranged the financial aspects, course program and selection criteria for applicants wishing to attend the training course.

### Facilities

It is planned that an in-house computer facility will become available next financial year. As a result, large quantities of data that are available both in Australia and via international data exchange programmes will be available to support ADF maritime operations. This data is generally only available in digital form and requires computer facilities to process and analyse. Data that is freely available includes:

Temperature.
Salinity.
Ocean Currents.
Bottom Types.
Water Clarity.
Wave Statistics.
Magnetics.
Gravity Anomalies.

## NAVAL WEATHER CENTRE, RAN AIR STATION, NOWRA (HMAS ALBATROSS)

### General

The Naval Weather Centre (NWC) has continued to provide extensive environmental support on request to aviation and maritime units from all three Australian services and units from other countries. During the period July 1987 to June 1988 the output of the NWC increased by 28%, the majority of the increase coming from requests from the Fleet.

### Meteorological Forecasts

The number of signals emanating from the NWC in response to specific requests for meteorological and climatological forecasts and data totalled 12936 for the reporting period. A large part of this increase was in maritime aviation support. An increase in the support given to the other armed services, particularly during exercises, has also been evident.

### Oceanographic Forecasting

The weekly Western Tasman Sea oceanographic charts have continued to grow in demand, especially from the civil community, and now have a distribution list of 70 military and civil organisations. The number of AUSRAP forecasts issued during the reporting period in response to requests from the RAN and RAAF was in excess of 500.

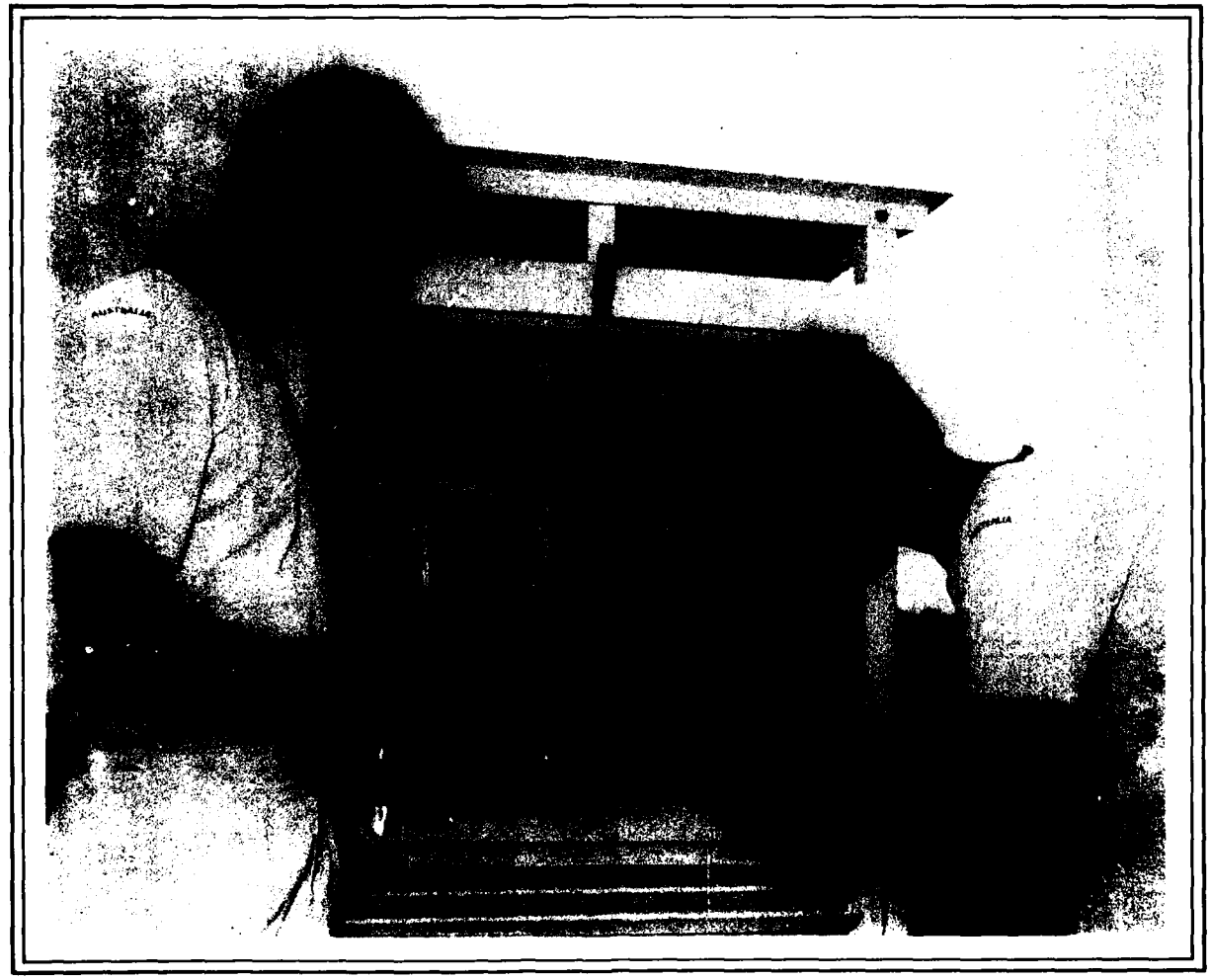
The sparsity of real time oceanographic data for the Western Tasman Sea area has remained a problem. An increase in data coverage is experienced during periods of Fleet Exercises, but this is mainly confined to the west of the area. HMNZ Ships exercising in or transiting the Tasman Sea have provided the few observations obtained in the east of the area.

Despite the presence of a dedicated oceanographic officer in the NWC, it has only been possible to produce a weekly oceanographic analysis of the West Australian Exercise Area, including the Leeuwin Current, during Fleet Concentration Periods, due to the extreme sparsity of data at other times. An improvement in this situation is expected early 1989 when the NWC will acquire the capability to receive colour enhanced sea surface satellite pictures for all Australian coastal waters.

### Computing Support

The provision of meteorological forecasts by the NWC is supported by a microcomputer, which allows the airfield and individual ship forecasts to be formatted on the VDU and then run off as a hard copy or put to paper tape for transmission by the communications centre. This terminal is also used in the provision of a Sonar Range Prediction (AUSRAP) service for the RAN and elements of the RAAF, for which purpose it is linked to a computer bureau, allowing the NWC access to a bank of oceanographic data. Improvements to this service have been under consideration throughout the year, with some experimental work being done in attempting to run the Sonar Range Prediction Model on the ICL DRS 300 computer in the NWC. This facility is also used to provide ballistic meteorological (BALMET) forecasts.

The NAVMET computing system proposal has been accepted this year and should be a reality within the next financial year. It will have specifically developed software to receive and transmit meteorological data to and from the Bureau of Meteorology using their Automated Regional Operations System (AROS). This will allow a variety of data sets to be displayed or plotted for subsequent analysis and will free the observers from a number of the more tedious manual tasks. Another important output of AROS is its automated meteorological warning system.



METEOROLOGICAL OBSERVATIONS AT THE NAVAL
WEATHER CENTRE, NAS NOWRA

Late in 1988 it is anticipated that further computer based support will be available in the Centre. The Australian regional MCIDAS system (ARM), based on an IBM AT and also supported by the Bureau of Meteorology, will allow the forecasters to display and overlay satellite imagery and computer generated analysis and prognosis charts, in addition to a number of three-dimensional temperature and wind fields. Such a system is expected to significantly reduce the demands on the existing facsimile weather chart recorder. The system will also permit the NWC to access weather radar images for coastal radar stations around Australia, which will be particularly useful in the preparation of forecasts for minor war vessels.

# SECTION 4

# PERSONNEL AND TRAINING

## PERSONNEL AND TRAINING

### Review of Commonwealth Mapping and Charting Functions

As a result of the review of Commonwealth Mapping and Charting Functions the decision was made during the year to place operational Commonwealth maritime surveying and charting activities under the Hydrographer RAN. Following this decision 39 Bathymetric Surveying Group staff will be transferred from the Department of Administrative Services on 1 July 1988. This group previously formed the Bathymetric Unit of the Division of National Mapping.

## ORGANISATIONAL CHANGES

The re-organisation of Commonwealth mapping functions has necessitated a Hydrographic Service Establishment and Organisation review. The principal features of the changes proposed in this review are:

* The Bathymetric Surveying Group will form an operations section based in Canberra. They will initially be employed in completing outstanding bathymetric map coverage.
* The corporate planning activities of the Hydrographic Service will be formed into a new Co-ordination and Development section, separating day-to-day activities from forward planning and co-ordinating activities.
* A number of positions will be reclassified upon vacancy in order to provide a more contemporary mix of technical, professional and management skills to service future Branch requirements.

A diagram of the new organisation and a list of principal officers is shown at Appendix 6.

In January 1988 the position of Hydrographer was upgraded to the rank of Commodore RAN.

## NUMBERS EMPLOYED

The establishment for civilian employees within the Hydrographic Office was 100 on 30 June 1988. 78 positions were filled, and 11 restaffing applications were being processed. The average staffing for the year was 77.

The numbers of uniformed personnel have not varied significantly during the year. Promotions, however, will leave the uniformed part of the branch a little thin in the junior ranks next year.

Details of uniformed and civilian staffing levels are shown in Appendix 5.

## TRAINING

### RAN Hydrographic School, HMAS PENGUIN

In 1988/89 one Hydrographic Officer's H4 course and two Basic Survey Recorder Courses were conducted. Training activity has been lower than normal, due to the commitment of resources to development and design of the basic training given to RAN Survey Recorders. The Officer's Course of 22 weeks duration was attended by RAN personnel only. The Survey Recorder courses of 12 weeks were attended by RAN personnel and foreign students sponsored by the Defence Co-operation Programme. In addition to the major career courses, a variety of instruction was given to a number of non-hydrographic organisations, including other RAN specialisations and students from the University of New South Wales.

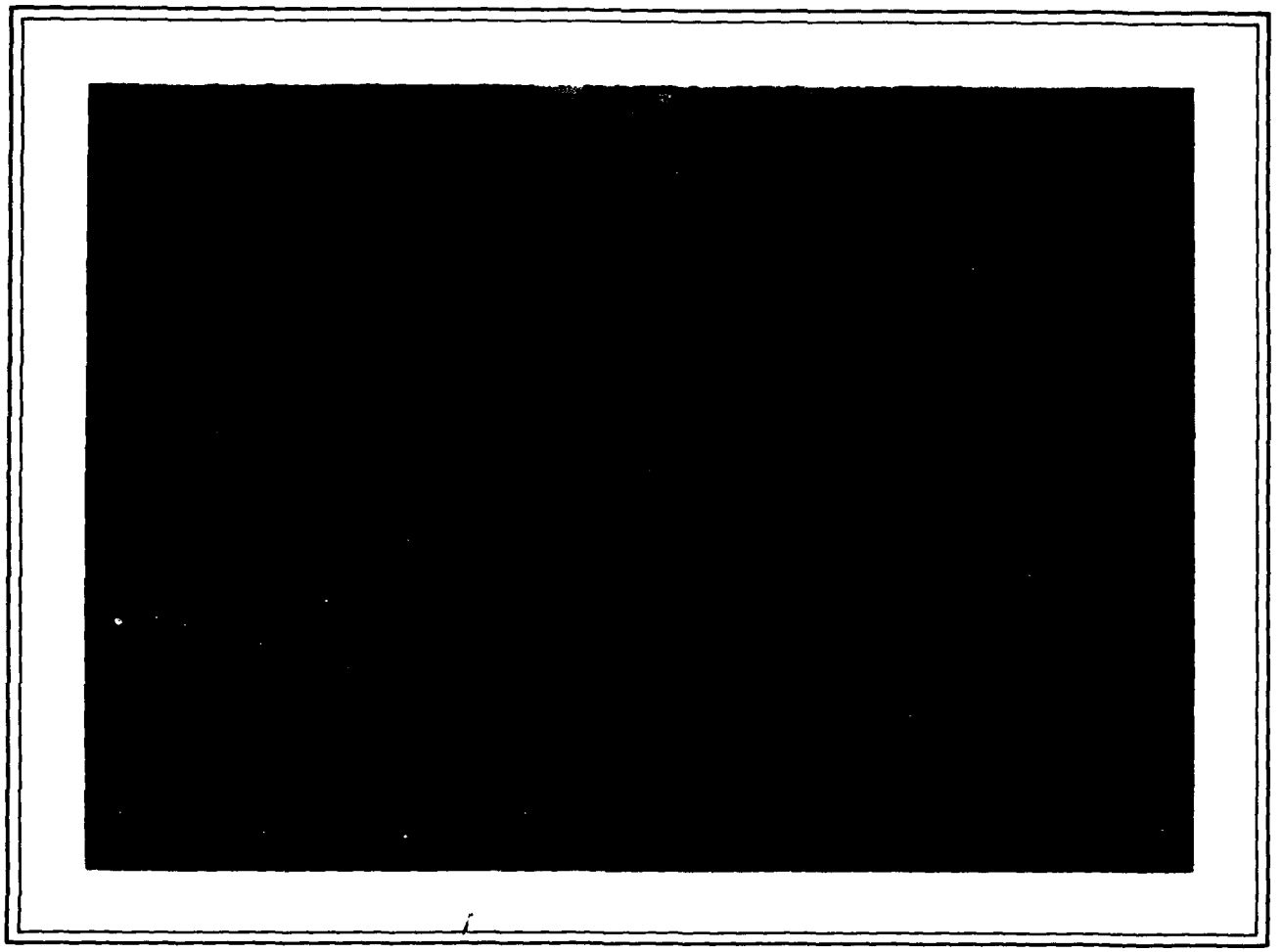
The review of training given to sailors of the Survey Recorder Branch was commenced in June 1987. This entailed visits to fleet units to conduct analysis of the job performance required. Subsequent development and documentation took nine months to complete. A pilot course of eight students is currently under instruction. The results of this course will be used to finalise the scope and duration of subsequent Survey Recorder training in the RAN.

Training throughout the period was supported by two Survey Motor Boats. Access to dedicated 4 wheel drive transport has meant that all field exercises are carried out in realistic survey environments within the Sydney area. New equipment supplied to the school includes computer support for training documentation and the acquisition of a Raytheon DE 719 portable echo sounder. Classroom refurbishment has been a major feature of the last three months. While this has meant an element of disruption, the improvements will provide a boost to the training facilities at the school. Future developments affecting training include the introduction of the RAN automatic data logging system HYDLAPS, scheduled for supply later in the year. The school will play a major role in subsequent operator training on this system.

### RAN School of Meteorology

Now in its 39th year of operation, the RAN School of Meteorology's primary role is to provide the basic training for RAN Meteorological Observers, and to conduct courses for all advanced category training. The throughput in the report period was two Basic Observers' courses, one Advanced Observers' course and five Advanced Windfind/Radiosonde courses. These courses are accredited with the Bureau of Meteorology.

A variety of specialised training also takes place in the School, with courses being conducted for the Army Parachute Training School, RAN Long Navigation Course, Small Ships' Flight Commanders' Course, and Junior Officer training.



RAN HYDROGRAPHIC SCHOOL COMBINED RAN/DCP
BASIC SURVEY RECORDER COURSE

## Cartographic Branch Training

In-house training in manual and digital chart compilation procedures has been provided for new staff in the drafting area.

On an opportunity basis drafting officers have been attached to HMAS MORESBY for familiarisation of surveying procedures at sea and to assist in fair drawing of survey data.

Departmental development courses in supervision and induction were attended by a number of drafting officers.

Two trainee drafting officers are currently studying the Land and Engineering Survey Drafting Certificate and part time studies have been taken up at various institutions by other draftspersons — Cartographic Certificate (2), Surveying Certificate (1), Bachelor of Applied Science (Industrial Mathematics and Computing) (3), Associate Diploma in Business (Commercial Data Processing) (1).

Two students from the Solomon Islands Hydrographic Unit were given basic cartographic training under the Defence Co-operation Programme.

## Oceanography Training

More than ever before, due to the rapid increases in complexity of modern warfare systems and sensors, knowledge of the ocean environment is becoming critical to effective naval operations. As weapons systems and sensors become more sensitive to variations in the environment in which they operate, it is vital that naval operators have an understanding of how the environment, both above, on and below the sea surface has an impact on sensor/system performance. As maritime tactics are frequently based on predicted sensor performance, naval tacticians too must have a thorough understanding of what changes in environmental factors mean in terms of adjusted sensor performance. The importance of understanding and predicting the ocean environment cannot be overstated.

The Officer-in-Charge of the RAN's Applied Oceanography Centre (AOC) is primarily responsible for the planning and provision of all oceanographic training conducted in the RAN. The AOC is located within the Australian Joint Maritime Warfare Centre (AJMWC) at NAS NOWRA and is staffed by an officer of Lieutenant Commander rank qualified in Meteorlogy and Military Oceanography.

Training is provided to four broad categories of personnel:

* Basic and advanced training of officers and sailors who will become warfare specialists in ships and submarines. 84 students attended courses in this category during the year.
* Training of Aircrew engaged in maritime warfare. 9 students attended courses in this category
* Training of Navy oceanographic specialists. 7 students received training in this category.
* Refresher training for personnel returning to Fleet duty. 130 students received refresher training during the year.

To meet this demand the conduct of oceanography training is split evenly between the Sydney area and NAS NOWRA. All Sydney area oceanography training is conducted by HMAS WATSON and all oceanography training conducted in NAS NOWRA is done by AOC. The awareness within the RAN operational community of the importance of the environment in naval operations continues to be raised and growth in demand for applied oceanography training is expected to continue.

# SECTION 5

# CO-ORDINATION AND DEVELOPMENT

## CO-ORDINATION AND DEVELOPMENT

### General

The Co-ordination and Development section was formed in April 1988 as a result of the re-organisation of the Hydrographic Service which followed the review of Commonwealth mapping and charting activities. It has the following sub-sections:

Administration Services
ADP and Computing Services
Planning and Resources
Liaison and Secretarial Services
Programme Budgeting

## BRANCH DEVELOPMENT

The section provides a focus for Branch development, which has previously been dealt with on an ad-hoc basis. Current activities include:

Information Management Study.
Hydrographic Service Capabilities Study.
ADP Strategic Plan.
Introduction of Programme Budgeting.

## LIAISON AND VISITS

The Hydrographic Service has been heavily involved in various National and International forums. Activities in the report period have included:

International Hydrographic Organisation.
- Committee on Standards for Digital Data Exchange.
- Committee on the Electronic Chart.
- Area Lima co-ordinator.
- Chart Standardization Committee.

Australian Association of Port and Marine Authorities.
- Specifications for Hydrographic Surveys.
- Australia-wide chart datum.
- Professional Status of Hydrographic Surveyors.

Maritime Services Advisory Committee.
- Torres Strait Working Party .

Australian National University.
- *Workshop on Defence applications of Geographic Information.*

Other committees and conferences in which the Service has been involved include:

Australian Surveying Industry Advisory Committee.
Australian Institution of Surveyors.
International Maritime Pilots Association.
Australian Institute of Navigation.
Intergovernmental Advisory Committee on Surveying and Mapping.

The Hydrographic Office has continued to receive working visits from a wide spectrum of people, including National and International government officials, military officers, members of the scientific community, commercial maritime and resource industry representatives, and the general public.

# APPENDICES

## APPENDIX 1

### SURVEYS UNDERTAKEN JULY 1987 — JUNE 1988

| Ship/Unit | Commanding Officer | Areas |
|---|---|---|
| HMAS MORESBY | CMDR R.J. Willis RAN | Thevenard I. to Barrow I. |
| HMAS FLINDERS | CMDR G.J. Geraghty RAN | Gannet and Varzin Passages<br>Western Approaches to Simpson Channel.<br>Connexion Channel.<br>Madang to Wewak. |
| HMAS BRUNEI | LCDR J.W. Patterson RAN<br>LCDR M.J. Sinclair RAN<br>(from 15 April 1988) | Claremont Isles to Heath Reef.<br>Nardana Patches.<br>Madang to Wewak. |
| HMAS BETANO | LCDR R.R. Nairn RAN | Claremont Isles to Heath Reef.<br>Brothers Patches.<br>Madang to Wewak. |
| HYDROGRAPHIC OFFICE DETACHED SURVEY UNIT | LCDR D.C. Bryce RN<br>LCDR R.J. Ball RN<br>(from 16 May 1988) | Jervis Bay.<br>Solomon Islands Deep Water Survey. |
| HMAS COOK | CMDR I.M. Watts RAN | Taupo Seamount |

Details of the areas covered by these surveys can be seen in Figures 1 — 8.

## APPENDIX 2

## CHART PRODUCTION STATISTICS

| New Chart Production | 1984/85 | 1985/86 | 1986/87 | 1987/88 |
|---|---|---|---|---|
| New Charts Published | 8 | 7 | 5 | 11 |
| New Editions Published | 16 | 37 | 14 | 12 |
| New Charts/Diagrams for RAN use | 10 | 12 | 6 | 23 |
| Miscellaneous Charts | — | 2 | 1 | 1 |
| **Chart Maintenance** | | | | |
| Modified facsimiles of BA charts | 3 | 2 | 1 | 0 |
| Notice to Mariners Block corrections | 15 | 18 | 32 | 41 |
| Chart revisions by reprint | 167 | 243 | 164 | 180 |
| Revisions by Screen Printing | — | — | — | 36 |
| Miscellaneous Graphics | 95 | 95 | 75 | 77 |
| **Chart Printing** | | | | |
| New charts | 8 | 7 | 5 | 11 |
| New editions | 16 | 37 | 14 | 12 |
| Revised charts | 167 | 243 | 164 | 180 |
| Reprinted charts | 94 | 146 | 206 | 165 |
| Facsimile reproductions | 0 | 2 | 0 | — |
| Modified reproductions | 3 | 2 | 1 | — |
| Charts for Fleet purposes | 3 | 4 | 4 | 4 |
| Miscellaneous charts | — | — | 1 | — |

Chart printing by RA Survey Regiment
Bendigo, Victoria — 370 charts. 167538 copies.

## CHART SCHEME STATISTICS 30-6-88

| Category/Scale | Published Imperial | Published Metric | Total Published | Total Planned |
|---|---|---|---|---|
| 1:150 000 Aus, PNG | 28 | 49 | 77 | 200 |
| 1:300 000 Aus, PNG | 48 | 11 | 59 | 101 |
| 1:1 000 000 Aus, PNG, Antarctica | 5 | 3 | 8 | 34 |
| 1:500 000 and smaller, Aus, PNG, Antarctica | 2 | 1 | 3 | 8 |
| Large scale 1:5 000 to 1:100 000 | | | | |
| Aus. | 23 | 90 | 113 | 187 |
| PNG. | 27 | 2 | 29 | 38 |
| Antarctica | 3 | 1 | 4 | 4 |
| Territories & Reefs | 3 | 2 | 5 | 19 |
| International charts 1:3 500 000 | 0 | 6 | 6 | 6 |
| International charts 1:10 000 000 | 0 | 1 | 1 | 1 |
| International charts 1:1 500 000 | 0 | 1 | 1 | 20 |
| PC (Pleasure Craft Charts) | 2 | 5 | 7 | 12 |
| RAN Fleet series | 23 | 10 | 33 | 40 |
| Diagrams | 19 | 12 | 31 | 40 |
| Totals: | 183 | 194 | 377 | 710 |

The United Kingdom Hydrographic Department continues to maintain 47 of their originally published charts in the Australian area of charting responsibility. These charts are included in the planned totals above under their respective series.

## DESCRIPTIONS OF NEW CHARTS

**Aus 600 Approaches to Mawson** (published 27-11-87)

Digital production at scale 1:25 000 to replace chart Aus 600 published 1-11-61 at scale 1:20 000. Limits redesigned to provide ocean coverage further north of the former chart limits and to include the full extent of the 1987 RAN approach survey to Mawson, the principal scientific station maintained by the Australian Government in Antarctica.

**Aus 602 Approaches to Davis Anchorage** (published 30-11-87)

Chart coverage of Australia's second most important station in Antarctica was formerly by plan shown on chart Aus 600 (1-11-61) described above. Now removed from new chart Aus 600, it has been published separately as chart Aus 602 and the details retained in imperial measurement pending planned new surveys.

**Aus 59 Plans in Port Dampier** (published 13-11-87)

*Charting requirements for the port were developed following discussions with Dampier Harbour Authorities. Three* charts were designed to provide maximum coverage of the port facilities and to provide mariners with charts at the most appropriate scale considering the size and volume of shipping transiting the port area. The three chart concept supersedes chart Aus 58 published 1969. Aus 59, the largest scale chart, (1:15 000) is divided into two plans. Plan 1 indicates the dredged channels to the wharf facilities at the Intercourse Islands, Hampton Harbour and Parker Point. Plan 2 indicates the dredged channel to Withnell Bay Terminal and King Bay.

**Aus 58 Approaches to Port Dampier** (published 26-1-88)

This chart replaces Aus 58, 1:75 000 (plan 1:25 000) published 7-11-69. At a much larger scale (1:37 500) the chart depicts port approach detail to support the larger scale chart Aus 59 described above. Navigation channels and aids are suitably displayed without the use of additional plan insets as shown on the previously published chart. The complex hydrographic detail contains many company contracted surveys supported by those conducted by the RAN and over 200 source documents were involved.

**Aus 54 Port Hedland** (published 30-10-87)

This is a full sized chart designed to replace Aus 54 of reduced dimensions, published 1974. The northern limits have been extended and coverage now features the dredged channel from the port to No. 34 outer beacon, providing mariners with more detail of entry and departure leads not previously shown.

**Aus 52 Entrance Channel to Port Hedland** (published 20-1-88)

Published to feature the outer dredged channel area and the supportive navigational aid system at a larger scale than previously charted. The actual charted area contains the port limits and emphasises the extent of the spoil ground areas east of the dredged channel.

**Aus 299 Approaches to Thursday Island** (published 29-4-88)

This chart forms part of a rescheme of large scale charting throughout the Torres Strait area. Aus 299 replaces former British Admiralty chart 383, published in 1952. Geographical limits have been extended to cover the western approaches to Thursday Island through Normanby Sound and eastward through Ellis Channel.

**Aus 332 Zuytdorp Point to Geraldton** (published 16-5-88)

Having completed the coastal series metric charts at scale 1:150 000 from Albany to Port Gregory, further new charting northward of latitude 28°10', across the vast expanse of Zuytdorp Cliffs, was considered more beneficial to navigation at scale 1:300 000. Metric chart Aus 332 replaces the former Aus 332 of imperial measurement published in 1969. The new chart includes RAN surveys of 1984-85 covering the coastal and ocean area from Zuytdorp Point south to Houtman Abrolhos.

***Aus 4726 (Int 726) Cape Leeuwin to Esperance*** (published 29-4-88)

This is the first chart of a series planned at scale 1:1 500 000 covering the Australian Area of Charting Responsibility. The scheme has been endorsed by the International Hydrographic Organisation and each published chart in the series will be adopted as an international chart under the International Charting Agreement. Aus 4726 was produced to adjoin chart Aus 417, Geraldton to Cape Leeuwin scale 1:1 000 000, (published 1986) and includes the same hydrographic details in the overlapping area. The chart will serve the marine community and international shipping as a route planning medium between Cape Leeuwin and the port of Esperance.

**Aus 724 Fog Bay to Port Keats** (published 16-5-88)

At scale 1:150 000 this chart is another product of the planned national coastal series. The chart provides access through Anson Bay to the mouth of the Daly River and affords details for coastal navigation between Fog Bay southwest of Port Darwin to Port Keats situated at the southern extremity of the chart.

**Aus 293 Prince of Wales Channel** (published 27-6-88)

Limits of previously published chart Aus 293 have been amended and sounding datum changed to Lowest Astronomical Tide. The chart includes RAN surveys of Simpson and Dayman Channels and Prince of Wales Channel.

## DESCRIPTIONS OF NEW EDITIONS

**Aus 53 Approaches to Port Hedland** (printed 6-8-87)

Includes RAN and Harbour Authority surveys 1986-87 in the area described as the inward eastern route to the Port. Dredged area depths throughout the main channel and navigation aids from port to seaward were amended.

**Aus 613 Marion Reef** (printed 18-9-87)

This chart was revised to include 1985 RAN reconnaissance surveys conducted inside the reef.

**Aus 814 Point Danger to Cape Moreton** (printed 3-9-87)

A general review of this chart was necessary following construction of the Gold Coast Seaway into The Broadwater north of Southport. A plan of the Southport Bar Entrance at scale 1:37 500 has been included and the chart updated generally.

**Aus 630 Eastern Approaches to Milne Bay** (printed 4-12-87)

This chart was revised to include information of navigational significance in the area east of the recommended track between Kegawam Islands and Emerald Reef. Remotely sensed data was used to outline sunken reefs and shoal water in unsurveyed areas.

**Aus 520 Cape Nelson to Cape Killerton** (printed 16-3-88)

General revision to include the overlapping area of new chart Aus 519 published November 1986.

**Aus 753 Beagle Islands to Lancelin** (printed 10-6-88)

New edition prepared to include W.A. Department of Marine and Harbour surveys of Jurien Bay and south to Booker Rocks, completed since chart Aus 753 was published in May 1986. Plan of Jurien Bay has also been updated to include the DMH survey.

**Aus 195 Port Kembla and Wollongong with Approaches** (printed 8-1-88)

General revision of this chart was required following further development of Port Kembla, Inner and Outer Harbour facilities and hydrographic surveys conducted by the Maritime Services Board and Department of Public Works.

**Aus 207 Approaches to Newcastle** (printed 27-6-88)

Programmed for revision to include approach to port surveys by the Maritime Services Board and to indicate previous revision details from chart Aus 208, Newcastle Harbour.

**Aus 811 Crowdy Head to Smokey Cape** (printed 30-6-88)

General revision and to include a plan of Camden Haven at scale 1:25000, surveyed by Public Works Department.

Note: The geographical coverage of new charts and new editions is shown in Figure 22.

## LIMITS OF NEW CHARTS PUBLISHED

| Number | Title and Limits | | Scale | Published Date |
|---|---|---|---|---|
| Aus 600 | Antarctica — Approaches to Mawson | | 1:25 000 | 27-11-87 |
| | Lat. 67°21′28″.2S | 67°36′30″.0S | | |
| | Long. 62°42′00″.0E | 63°04′48″.7E | | |
| | Plan — Horseshoe Harbour | | 1:5 000 | |
| | Lat. 67°35′35″.6S | 67°36′24″.0S | | |
| | Long. 62°51′10″.0E | 62°53′00″.0E | | |
| Aus 602 | Antarctica — Approaches to Davis Anchorage | | 1:20 000 | 30-11-87 |
| | Lat. 68°32′19″.0S | 68°35′53″.5S | | |
| | Long. 77°49′30″.5E | 77°59′40″.1E | | |
| Aus 59 | Western Australia — Plans in Port Dampier | | | 13-11-87 |
| | Plan — Withnell Bay to King Bay | | 1:15 000 | |
| | Lat. 20°33′33″.7S | 20°38′40″.0S | | |
| | Long. 116°43′17″.9E | 116°48′06″.0E | | |
| | Plan — Dampier Wharves | | 1:15 000 | |
| | Lat. 20°35′29″.7S | 20°40′36″.0S | | |
| | Long. 116°39′01″.0E | 116°43′46″.0E | | |
| Aus 54 | Western Australia — Port Hedland | | 1:7 500 | 30-10-87 |
| | Lat. 20°15′36″.0S | 20°19′48″.0S | | |
| | Long. 118°33′29″.1E | 118°36′18″.0E | | |
| Aus 58 | Western Australia — Port of Dampier | | 1:37 500 | 26-01-88 |
| | Lat. 20°18′18″.0S | 20°41′01″.2S | | |
| | Long. 116°36′57″.2E | 116°51′02″.0E | | |
| Aus 52 | Western Australia — Entrance Channel to Port Hedland | | 1:25 000 | 20-01-88 |
| | Lat. 20°06′00″.0S | 20°20′00″.0S | | |
| | Long. 118°29′00″.0E | 118°38′22″.3E | | |
| Aus 299 | Queensland — Thursday Island and Approaches | | 1:12 500 | 29-04-88 |
| | Lat. 10°32′14″.0S | 10°36′39″.8S | | |
| | Long. 142°08′45″.0E | 142°15′49″.8E | | |

| | | | | | |
|---|---|---|---|---|---|
| Aus 332 | Western Australia — Zuytdorp Point to Geraldton | | | 1:300 000 | 16-05-88 |
| | Lat. | 26°19'53".9S | 29°07'00".0S | | |
| | Long. | 112°50'00".0E | 114°48'44".8E | | |
| Aus 4726 (Int.726) | Western Australia — Cape Leeuwin to Esperance | | | 1:1 500 000 | 29-04-88 |
| | Lat. | 32°00'00".0S | 39°43'44".4S | | |
| | Long. | 108°39'42".2E | 123°00'00".0E | | |
| Aus 724 | Northern Territory — Fog Bay to Port Keats | | | 1:150 000 | 16-05-88 |
| | Lat. | 12°32'02".0S | 14°04'00".0S | | |
| | Long. | 129°25'37".5E | 130°25'00".0E | | |
| Aus 293 | Queensland — Prince of Wales Channel | | | 1:37 500 | 26-06-88 |
| | Lat. | 10°23'28".0S | 10°36'45".3S | | |
| | Long. | 142°06'30".0E | 142°27'44".0E | | |

## LIMITS OF NEW EDITIONS PUBLISHED

| Number | Title and Limits | | | Scale | New Edition Date |
|---|---|---|---|---|---|
| Aus 53 | Western Australia — Approaches to Port Hedland | | | 1:50 000 | 6-8-87 |
| | Lat. | 19°51'59".0S | 20°20'00".0S | | |
| | Long. | 118°19'47".0E | 118°38'30".0E | | |
| Aus 613 | Coral Sea — Marion Reef | | | 1:150 000 | 18-9-87 |
| | Lat. | 18°42'00".0S | 19°38'25".1S | | |
| | Long. | 151°55'00".0E | 152°38'55".5E | | |
| Aus 814 | Queensland — Point Danger to Cape Moreton | | | 1:150 000 | 30-9-87 |
| | Lat. | 26°48'00".0S | 28°11'44".0S | | |
| | Long. | 153°00'30".0E | 154°00'52".0E | | |
| | Plan — Southport Bar Entrance | | | 1:37 500 | |
| | Lat. | 27°54'27".0S | 27°59'00".0S | | |
| | Long. | 153°24'00".0E | 153°27'25".2E | | |
| Aus 630 | Papua New Guinea — Eastern Approaches to Milne Bay and Goschen Strait | | | 1:75 000 | 4-12-87 |
| | Lat. | 10°11'00".0S | 10°37'36".0S | | |
| | Long. | 150°55'00".0E | 151°37'27".0E | | |
| Aus 520 | Papua New Guinea — Cape Nelson to Cape Killerton | | | 1:150 000 | 16-3-88 |
| | Lat. | 8°30'00".0S | 9°22'00".0S | | |
| | Long. | 148°12'00".0E | 149°43'00".0E | | |
| Aus 195 | New South Wales — Port Kembla and Wollongong with Approaches | | | 1:25 500 | 8-1-88 |
| | Lat. | 34°21'45".0S | 34°30'05".0S | | |
| | Long. | 150°50'53".0E | 150°59'12".0E | | |
| | Plan — Port Kembla | | | 1:6 000 | |
| | Lat. | 34°26'50".1S | 34°28'50".1S | | |
| | Long. | 150°52'43".1E | 150°54'58".4E | | |

| | | | | | |
|---|---|---|---|---|---|
| Aus 753 | Western Australia — Beagle Islands to Lancelin | | | 1:150 000 | 10-6-88 |
| | Lat. | 29°44'37".2S | 31°06'00".0S | | |
| | Long. | 114°25'37".5E | 115°25'00".0E | | |
| Aus 207 | New South Wales — Approaches to Newcastle | | | 1:25 000 | 26-6-88 |
| | Lat. | 32°48'11".0S | 33°01'14".0S | | |
| | Long. | 151°42'37".0E | 151°52'56".0E | | |
| Aus 811 | New South Wales — Crowdy Head to Smokey Cape | | | 1:150 000 | 30-6-88 |
| | Lat. | 30°38'00".0S | 31°53'00".0S | | |
| | Long. | 152°40'00".0E | 153°40'00".0E | | |
| | Plan — Camden Haven | | | 1:25 000 | |
| | Lat. | 31°37'36".0S | 31°39'36".0S | | |
| | Long. | 152°47'30".0E | 152°52'00".0E | | |

## CHARTS IN PRODUCTION (30th June 88)

NC — New Chart.
NE — New Edition.

| Chart No | Category | Title | Scale | State |
|---|---|---|---|---|
| Aus 119 | NE | Approaches to Esperance | 1:75000 | W.A. |
| Aus 112 | NE | Approaches to Fremantle | 1:37500 | W.A. |
| Aus 763 | NC | Cape LeGrande to Cape Pasley | 1:150000 | W.A. |
| Aus 57 | NC | Dampier Archipelago | 1:75000 | W.A. |
| Aus 725 | NC | Port Keats to Victoria River | 1:150000 | N.T. |
| Aus 728 | NE | Eclipse Island to Cape Voltaire | 1:150000 | W.A. |
| Aus 320 | NC | Browse Island to Adele Island | 1:300000 | W.A. |
| Aus 828 | NE | Palm Islands to Brook Islands | 1:150000 | Qld |
| Aus 260 | NC | Broad Sound Channel & Shoalwater Bay | 1:75000 | Qld |
| Aus 835 | NE | Cape Weymouth to Cairncross Islets | 1:150000 | Qld |
| Aus 256 | NC | Cleveland Bay & Approaches | 1:50000 | Qld |
| Aus 257 | NC | Townsville Harbour & Ross River Entrance | 1:7500 | Qld |
| Aus 200 | NE | Port Jackson | 1:20000 | N.S.W |
| Aus 294 | NC | Endeavour Strait | 1:75000 | Qld |
| Aus 296 | NE | Goods Island to Proudfoot Shoal | 1:75000 | Qld |
| Aus 292 | NC | Adolphus Channel to Prince of Wales Channel | 1:75000 | Qld |
| Aus 343 | NC | Whidbey Isles to Cape Couediec | 1:300000 | S.A. |
| Aus 117 | NE | Gage Roads & Cockburn Sound | 1:25000 | W.A. |
| Aus 248 | NC | Port Clinton | 1:25000 | Qld |
| Aus 839 | NE | Cairncross Islets to Arden Islet | 1:150000 | Qld |
| Aus 701 | NC | Vrilya Point to Duyfken Point | 1:150000 | Qld |
| Aus 314 | NC | Sahul Banks Western Sheet | 1:300000 | Timor Sea |
| Aus 822 | NE | Port Clinton to Percy Isles | 1:150000 | Qld |
| Aus 4 | NE | Approaches to Weipa | 1:75000 | Qld |
| Aus 236 | NE | Moreton Bay | 1:75000 | Qld |
| Aus 235 | NE | Approaches to Moreton Bay | 1:75000 | Qld |
| Aus 832 | NE | Cape Flattery to Barrow Point | 1:150000 | Qld |
| Aus 249 | NE | Hay Point to Penrith Island | 1:75000 | Qld |
| Aus 333 | NC | Geraldton to Ledge Point | 1:300000 | W.A. |
| Aus 334 | NC | Ledge Point to Cape Naturaliste | 1:300000 | W.A. |
| Aus 335 | NC | Cape Naturaliste to Point D'Entrecasteaux | 1:300000 | W.A. |
| Aus 762 | NC | Rocky Islands to Cape Le Grande | 1:150000 | W.A. |
| Aus 4634 | NC | Mackay to Port Moresby | 1:1500000 | Qld/PNG |
| Aus 148 | NC | Kent Group — Murray Passage | 1:25000 | Bass Strait |

**To commence September 1988 —**

| | | | | |
|---|---|---|---|---|
| Aus 726 | NE | Approaches to Cambridge Gulf | 1:150000 | W.A. |
| Aus 727 | NC | Rocky Islet to Eclipse Islands | 1:150000 | W.A. |
| Aus 729 | NC | Cape Voltaire to Cape Pond | 1:150000 | W.A. |
| Aus 730 | NC | Cape Pond to Degerando Island | 1:150000 | W.A. |
| Aus 732 | NC | Buccaneer Archipelago & Collier Bay | 1:150000 | W.A. |
| Aus 733 | NC | Buccaneer Archipelago & King Sound | 1:150000 | W.A. |
| Aus 318 | NC | Pelican Island to Penguin Shoal | 1:300000 | W.A |

| | | | | |
|---|---|---|---|---|
| Aus 319 | NC | Penguin Shoal to Browse Island | 1:300000 | W.A. |
| Aus 323 | NC | Adele Island to Lacepede Island inc. King Sound | 1:300000 | W.A. |
| Aus 316 | NC | Charles Point to Pelican Islet | 1:300000 | N.T. |
| Aus 301 | NC | Booby Islet to Archer River | 1:300000 | Qld |
| Aus 309 | NC | Darwin to Penguin Shoal | 1:300000 | N.T. |
| Aus 310 | NC | Cape Van Diemen to Masela Island | 1:300000 | Timor Sea |
| Aus 311 | NC | Timor Sea (Eastern Sheet) | 1:300000 | Timor Sea |
| Aus 312 | NC | Sahul Banks inc. Timor (Eastern Sheet) | 1:300000 | Timor Sea |
| Aus 315 | NC | Timor Sea (Central Sheet) | 1:300000 | Timor Sea |

Note: Location of charts in production is shown in Figure 23.

## DIGITAL CHARTS PUBLISHED (See Figure 24)

The following charts have been processed through the "Autochart" system, which has been in productive operation since 1979. Digital capture of information has been effected for topography, bathymetry, nomenclature and symbology, including navigation aids.

| Number | Title | Scale | Published Date | State |
|---|---|---|---|---|
| Aus 5060 | Australian Fishing Zone Limits | 1:10000000 | NE 14-11-84 | — |
| Aus 4060 | Australasia & Adjacent Waters | 1:10000000 | 16-04-87 | — |
| Aus 758 | Point D'Entrecasteaux to Point Hillier | 1:150000 | 21-03-80 | W.A. |
| Aus 757 | Cape Leeuwin to Point D'Entrecasteaux | 1:150000 | 13-02-81 | W.A. |
| Aus 105 | Wedge Island to Lancelin | 1:50000 | 27-05-81 | W.A. |
| Aus 116 | Plans in Western Aust. west and south coasts | — | 27-05-81 | W.A. |
| Aus 756 | Cape Naturaliste to Cape Leeuwin | 1:150000 | 5-2-82 | W.A. |
| Aus 111 | Careening Bay and Approaches | 1:7500 | 20-09-82 | W.A. |
| Aus 109 | Port of Albany | 1:12500 | 8-06-82 | W.A. |
| Aus 110 | King George Sound | 1:25000 | 26-01-83 | W.A. |
| Aus 118 | Approaches to King George Sound | 1:75000 | 17-06-83 | W.A. |
| Aus 759 | Point Hillier to Bald Island | 1:150000 | 9-03-84 | W.A. |
| Aus 336 | Cape Leeuwin to King George Sound | 1:300000 | 16-09-84 | W.A. |
| Aus 744 | Exmouth Gulf with Approaches | 1:150000 | 30-10-84 | W.A. |
| Aus 58 | Port of Dampier & Approaches | 1:75000 | NE 18-03-82 | W.A. |
| Aus 745 | North West Cape to Point Maud | 1:150000 | 31-05-85 | W.A. |
| Aus 752 | Pelsart Island to Beagle Islands | 1:150000 | 12-06-85 | W.A. |
| Aus 755 | Cape Peron to Cape Naturaliste | 1:150000 | 12-05-85 | W.A. |
| Aus 328 | Montebello Islands to North West Cape | 1:300000 | 1-12-85 | W.A. |
| Aus 115 | Port of Bunbury | 1:50000 | NE 26-06-85 | W.A. |
| Aus 32 | Cambridge Gulf | 1:75000 | NE 30-05-86 | W.A. |
| Aus 754 | Lancelin to Cape Peron | 1:150000 | 30-06-86 | W.A. |
| Aus 751 | Houtman Abrolhos & Geelvink Channel | 1:150000 | 24-11-86 | W.A. |
| Aus 753 | Beagle Islands to Lancelin | 1:150000 | NE 10-06-88 | W.A. |
| Aus 415 | Cape Leveque to Montebello Islands | 1:1000000 | 24-06-86 | W.A. |
| Aus 416 | Montebello Islands to Geraldton | 1:1000000 | 17-10-86 | W.A. |
| Aus 417 | Geraldton to Cape Leeuwin | 1:1000000 | 1-12-86 | W.A. |
| Aus 113 | Port of Fremantle | 1:7500 | NE 24-10-86 | W.A. |
| Aus 4726 | Cape Leeuwin to Esperance | 1:1500000 | 29-04-88 | W.A. |
| Aus 52 | Entrance Channel to Port Hedland | 1:25000 | 20-01-88 | W.A. |
| Aus 56 | Port Dampier | 1:37500 | 26-01-88 | W.A. |
| Aus 54 | Port Hedland | 1:7500 | 30-10-87 | W.A. |
| Aus 59 | Plans in Port Dampier | — | 13-11-87 | W.A. |
| Aus 665 | Eleanora Bay | 1:25000 | 27-05-81 | P.N.G. |
| Aus 380 | Port Moresby to Orangerie Bay | 1:300000 | NE 1-6-86 | P.N.G. |
| Aus 519 | Ward Hunt Strait to Star Reefs Passage | 1:150000 | 14-11-86 | P.N.G. |
| Aus 506 | Hood Point to Rothery Passage | 1:150000 | NE 6-1-87 | P.N.G. |
| Aus 199 | Botany Bay | 1:12000 | 1-06-81 | N.S.W |
| Aus 198 | Approaches to Botany Bay & Port Hacking | 1:25000 | 7-08-82 | N.S.W |
| Aus 208 | Newcastle Harbour | 1:7500 | NE 21-12-84 | N.S.W |
| Aus 220 | Plans in NSW North Coast | — | NE 7-03-86 | N.S.W |
| Aus 193 | Jervis Bay & Approaches | 1:37500 | NE 1-08-86 | N.S.W |
| Aus 195 | Port Kembla to Wollongong | 1:25000 | NE 8-01-88 | N.S.W |
| Aus 207 | Approaches to Newcastle | 1:25000 | NE 26-6-88 | N.S.W |
| Aus 837 | Olinda Entrance to Maer Island | 1:150000 | 10-10-82 | Qld |
| Aus 836 | Cape Weymouth to Olinda Entrance | 1:150000 | 15-08-83 | Qld |
| Aus 376 | Torres Strait | 1:300000 | 3-01-84 | Qld |
| Aus 244 | Plans in Port Gladstone | — | 3-01-84 | Qld |
| Aus 255 | Approaches to Abbot Point | 1:25000 | 31-08-84 | Qld |

| | | | | |
|---|---|---|---|---|
| Aus 821 | Hydrographers Passage | 1:150000 | 5-10-84 | Qld |
| Aus 245 | Port of Gladstone | 1:25000 | 16-01-85 | Qld |
| Aus 246 | Approaches to Gladstone | 1:37500 | 29-03-85 | Qld |
| Aus 237 | Brisbane River (Entrance) | 1:12500 | NE 13-07-84 | Qld |
| Aus 613 | Marion Reef | 1:150000 | 28-06-85 | Qld |
| Aus 262 | Approaches to Cairns | 1:20000 | NE 26-08-85 | Qld |
| Aus 377 | Bligh Entrance to Eastern Fields | 1:300000 | 1-10-85 | Qld |
| Aus 238 | Brisbane River | 1:12500 | NE 29-11-85 | Qld |
| Aus 299 | Thursday Island and Approaches | 1:12500 | 29-04-88 | Qld |
| Aus 293 | Prince of Wales Channel | 1:37500 | 26-06-88 | Qld |
| Aus 182 | Plans in Victoria, SE coast | — | 26-01-83 | Vic. |
| Aus 181 | Approaches to Corner Inlet and Port Albert | 1:50000 | 22-08-83 | Vic. |
| Aus 155 | Approaches to Port Melbourne | 1:37500 | NE 27-6-86 | Vic. |
| Aus 28 | Port Darwin | 1:25000 | NE 12-7-85 | N.T. |
| Aus 724 | Fog Bay to Port Keats | 1:150000 | 16-5-88 | N.T. |
| Aus 600 | Approaches to Mawson | 1:25000 | 27-11-87 | Antarctica |

Note: The extent of digital chart coverage is shown in Figure 24.

# APPENDIX 3

## HYDROGRAPHIC INFORMATION RECEIVED DURING THE YEAR

### Hydrographic Information Received from RAN Sources

| | | |
|---|---|---|
| **HMAS MORESBY** | HI 108 | Holothuria Banks |
| | HI 109 | Ashmore Reef |
| | HI 114 | Sahul Banks |
| | HI 117 | Esperance |
| **HMAS FLINDERS** | HI 107 | Wessel Islands |
| | HI 115 | Western Approaches to Simpson Channel |
| | HI 118 | Gannet & Varzin Passage |
| | HI 1/118 | Varzin Passage & Approaches |
| | HI 127 | Connexion Channel |
| | HI 129 | West Nuakata Island, PNG. |
| **HMAS BETANO** | HI 115 | Torres Strait & Brothers Patches Reconnaissance |
| | HI 119 | Brothers Patches |
| | HI 121 | Claremont Isles to Heath Reef |
| | — | Arnhem Land Reconnaissance |
| | — | Claremont Isles to Heath Reef Reconnaissance |
| **HMAS BRUNEI** | HI 111 | Montague Sound |
| | HI 122 | Nardana Patches |
| **HMAS BENDIGO** | | Alert Patches Investigation 1987 |
| **HMAS COOK** | HI 123 | Taupo Seamount |
| | Oceanic | Sydney — New Zealand — Samoa Sounding. |

### Hydrographic Office Detached Survey Unit

| | | |
|---|---|---|
| **MV CAPE PILLAR** | HI 113 | Solomon Islands EEZ Survey |

### Hydrographic Information Received from Non-Service Sources

| *Source* | *General Locality* | *Title or Location of Survey* |
|---|---|---|
| **NEW SOUTH WALES** | | |
| Darling Hbr. Auth. | Sydney | Darling Harbour |
| Dept. of Housing & Construction | Sydney | Garden Island |
| Maritime Services Board | Grafton | Clarence River |
| | Hastings River | Port Macquarie |
| | Lord Howe Is. | Lord Howe Is. |
| | Sydney | Middle Harbour |
| Public Works Dept. | Batemans Bay | Batemans Bay |
| | Coffs Harbour | Erosion Study |
| | Gosford | Hawkesbury River |
| | Grafton | Clarence River |
| | Newcastle | Lake Macquarie |
| | | Nelson Bay |

| | | |
|---|---|---|
| | Port Kembla | Port Stephens |
| | Port Macquarie | Grain Terminal |
| | | Fishing Port Complex |
| | | Hasting River Entrance |
| | Sydney | Circular Quay |
| | | Georges River |
| | Wollongong | Shoalhaven River |
| **NORTHERN TERRITORY** | | |
| Darwin Port Authority | Darwin | *Approaches to Darwin* |
| | | Frances Bay |
| | | Sudgroves Creek |
| **QUEENSLAND** | | |
| *Barrier Reef Holdings Ltd.* | *Great Barrier Rf.* | John Brewer Reef |
| Cairns Port Authority | Cairns | Trinity Channel |
| Cairns Harbour Board | Cairns | Cairns Wharves |
| Dept. Admin Services | Great Barrier Rf. | Ribbon Reef & Adjacent Reef |
| | | Williamson & Adjacent Reef |
| Dept. Harbours & Marine | Bowen | North Entrance Channel |
| | Brisbane | Cabbage Tree Creek |
| | | Cleveland Point |
| | | Mooloolah River Ent. |
| | | Pinkenba Field Survey |
| | | Toorbul |
| | Cape York Pen. | Margaret Bay |
| | Cooktown | Cooktown Entrance |
| | Gladstone | Boyne River Entrance |
| | Gold Coast | Canals & Nerang River |
| | | G. Coast Bridge to Jacobs Well |
| | | Seaway and Approaches |
| | *Great Barrier Rf.* | *Fitzroy Reef Entrance* |
| | Karumba | Norman River Entrance |
| | Mackay | Dalrymple Bay |
| | | Haypoint Entrance Ch. |
| | | Haypoint Tug Harbour |
| | | Outer Harbour Approach |
| | Marlborough | Beelbi Creek |
| | | Urangan Boat Harbour |
| | Mourilyan | Harbour Entrance |
| | | Road Work |
| | Mooloolaba | Boat Harbour Entrance |
| | Moreton Bay | Dunwich One Mile |
| | | Boat Haven |
| | | *North West Channel* |
| | Noosa | Noosa Beach |
| | Port Douglas | Boat Harbour |
| | Rockhampton | Cape Manifold |
| | | Rosslyn Bay |
| | | Stockyard Point |
| | | The Three Rivers |
| | Torres Strait | Thursday Island |
| | Townsville | Breakwater Marina |
| | | Harbour & River Ent. |
| | | Lucinda Offshore Jetty |
| | | Townsville |
| | Weipa | Albatross Bay |
| | | *Cora Bank (East)* |
| | | Eastern Tug Basin |
| | | Gonbung Shoal |
| | | Humbug Wharf |
| | | Lorim Pt. Wharf |
| | | South Channel |
| | Whitsunday | Dent Passage |
| | | Hamilton Island |
| | | Hayman Island to |
| | | Stanley Point |
| | | Hook Island |
| | Wide Bay | Wide Bay Bar |

| | | |
|---|---|---|
| G.B.R. Marine Park Auth. | Great Barrier Rf. | Egret Reef |
| Mackay Port Authority | Mackay | Outer Harbour |
| Mapping & Hydro. Survey | Mackay | Half Tide Tug Harbour |
| | Whitsunday | South Molle |
| Port of Brisbane Authority | Brisbane | White Is. Tug Beach |
| | Moreton Bay | North West Fairway |
| Townsville Harbour Board | Townsville | General Harbour Plan |
| | | Port of Townsville |
| | | Ross Creek Sounding |

**WESTERN AUSTRALIA**

| | | |
|---|---|---|
| Dept. Marine & Harbours | Albany | King George Sound Nornalup, Walpole Inlets |
| | Carnarvon | Teggs Approach Ch. |
| | Jurien Bay | Jurien Boat Harbour |
| | Wyndham | Cambridge Gulf |
| Mt. Newman Mining Co. | Port Hedland | *Harbour Facilities* |
| Port Hedland Port Auth. | Port Hedland | Pilot Boarding Area |
| | | Port Hedland Harbour |
| | | Spoil Bank |
| Public Works Dept. — W.A. | Seabird | Breton Survey |
| | | Lead Line Invest. |
| | | Survey |
| Western Mining Corp. Ltd | Airlie Island | Tanker Mooring Area |
| Woodside Offshore Petro. Pty Ltd | Dampier | *Mermaid Sound* |
| | | M.O.F. Wharf |
| | | N.W. of Kings Bay |
| | | Supply Base. |
| | | N.W. Shelf Development |
| | | Project. |

**VICTORIA**

| | | |
|---|---|---|
| Port of Melbourne Auth. | Corner Inlet | Entrance |
| | | McLoughlins Channel |
| | | Port Albert Channel |
| | | Port Albert Ent. Ch. |
| | | Port Welshpool |
| | Lakes Entrance | Gippsland Lakes |
| | Port Phillip | Appr. to Queenscliff |
| | | Northern Entrance |
| | | Channel |
| | | Portarlington Pier & Approaches. |
| | | Portsea to South Ch Fort. |
| | | Rip Bank |
| | | Royal George Shoal |
| | | Rye to Rosebud |
| | | *Sorrento* to Rye |
| | | South Channel |
| | | Swan Island |
| | | West Channel |
| | | West Channel to |
| | | Annale Channel |
| | Western Port | Index |
| | | *Hastings Channel* |

**SOUTH AUSTRALIA**

| | | |
|---|---|---|
| Dept. Marine & Harbours | Adelaide | Marino to Maslin Beach |
| | | O'Sullivan Beach |
| | | Outer Harbour Silt Ground. |
| | | Port Adelaide & Appr. |
| | | Port Giles Soundings |
| | | St. Kilda Channel |
| | Spencer Gulf | Franklin Harbour |
| | Wallaroo | Wallaroo |

| | | |
|---|---|---|
| | Gulf of St. Vincent | *Glenelg*<br>Grange Type Reef<br>*Zanoni* and Hopper Barge Wreck |

**TASMANIA**

| | | |
|---|---|---|
| Burnie Port Authority | Burnie | Port of Burnie |

## AUSTRALIAN SURVEYING AND LAND INFORMATION GROUP DEPARTMENT OF ADMINISTRATIVE SERVICES

**Bathymetric Maps**

Abington Reef
Augusta
Aurukun
Brisbane
Browse Island
Caloundra
Camden Sound
Cape Croker
Cooloongatta
Ingham
Irwin Inlet
Jardine River
Magnetic Passage
Maryborough
Nuyts
Port McDonnell
Rockhampton
Lawrence
Townsville
Weipa
Wide Bay
Balladonia
Bremer Bay
Bundaberg
Colac
Culver
Nanaera
Nullarbor
Portland
Rockhampton
Sale
Fowler

**Bathymetric Manuscript**

Apsley Strait
Ayr
Broadhurst Reef
Cape Scott
Elizabeth Reef
Elphinstone Reef
Gould Reef
Medusa Banks
Newby Shoal
Ribbon Reef

**Bathymetric Report of Survey**

Great Barrier Reef (1979, 1980, 1987).

**OVERSEAS**

| | | |
|---|---|---|
| Shell PNG Ltd. | Papua New Guinea | Port Moresby Harbour |
| Solomon Island Hydrographic Unit. | Solomon Islands | Luesalo/Gruciosa Bay<br>Rereghana Passage/Mbiula |
| RNZN | South Pacific Ocean<br>North Island,<br>New Zealand | Wanganella Bank<br>S.E. Great Barrier Island |

## ANTARCTIC REGION

| Source | Location |
|---|---|
| M.S. "Nella Dan". — Nati Institute of Polar Research — Tokyo, Japan. | Holme Bay & Approaches<br>Antarctic Geological Map Series |

## PUBLISHED CHARTS RECEIVED

| Source | Location |
|---|---|
| Royal Fiji Military Forces — | New Zealand, Fiji & Samoa Island.<br>Tasman, Coral & Solomon Sea. |

## BOATING CHARTS RECEIVED

| Source | State | Locality |
|---|---|---|
| Dept. Harbours and Marine | QLD | Boonlye Pt. to Hervey Bay |
| | QLD | Double Is. Pt. & Tincan Bay to Boonlye Pt. |
| Sunmap Centre | QLD | Coochiemudlo Is. to Wellington Pt. |
| Public Works Dept. | W.A | Rottnest Island |
| Dept. Harbours & Marine | S.A | Marino to Maslin Beach |

## TOPOGRAPHIC MAPS RECEIVED: (incl. Orthophotomaps)

Published by:

Central Mapping Authority: 1
Joint Operation Graphic: 30
National Mapping: 31
R.A.S.C: 291
S. Australian Dept. of Lands: 6
SUNMAP: 52
TASMAP — Dept. of Lands: 31
VICMAP — Dept. of Property & Services: 4

## SATELLITE IMAGERY RECEIVED FROM AUSTRALIAN CENTRE FOR REMOTE SENSING

Cocos Island (Keeling Island)
Cooktown
Lizard Island

## SATELLITE IMAGERY RECEIVED FROM AUSTRALIAN SURVEYING AND LAND INFORMATION GROUP

Cape Direction
Castlereagh Bay
E. Torres Strait
Princess Charlotte Bay
Wessel Island
Admiralty Gulf, W.A
Blue Mud Bay, N.T
Cape Bougainville, W.A
Castreagh Bay, N.T
Collier Bay, W.A
E. Torres Strait, QLD
Junction Bay, N.T
Sunday Strait, W.A
Van Dieman Gulf, N.T
Wessel Island, N.T
W. Torres Strait, QLD
Fly River Mouth, PNG
Karkar Island, PNG
Manus Island, PNG
Wewak, PNG

# APPENDIX 4

## DISTRIBUTION AND SUPPLIES

**Volume of sales and distribution of charts and associated publications:**

| | | 1985/86 | 1986/87 | 1987/88 |
|---|---|---|---|---|
| Australian | Issued | 151484 | 27123 | 29166 |
| | Sold | | 124680 | 116360 |
| British Admiralty | Issued | 22873 | 6035 | 14527 |
| | Sold | | 14658 | 9779 |
| New Zealand | Issued | 954 | 264 | 1458 |
| | Sold | | 918 | 720 |
| Canadian | Issued | 177 | 30 | 16 |
| | Sold | | 70 | 68 |
| TOTAL | | 175488 | 173788 | 172094 |

**Value of sales of charts and associated publications (Not including Sales Tax.)**

| | $ | $ | $ |
|---|---|---|---|
| Australian | 682673 | 706589 | 706030 |
| British Admiralty | 136088 | 104301 | 104328 |
| New Zealand | 1615 | 1846 | 3131 |
| Canadian | 449 | 455 | 442 |
| TOTAL | 820825 | 813191 | 813930 |

**Financial Resume**

| | $ | $ | $ |
|---|---|---|---|
| Value of goods sold (Net) | 820825 | 813191 | 813930 |
| Sales Tax recovered | 50419 | 62048 | 64765 |
| Freight and Sundries | 9555 | 8518 | 7907 |
| Total Revenue | 880799 | 883757 | 886602 |

**Recommended Retail Chart Prices as at 30/6/87**
**(Includes Sales Tax)**

| | 1985/86 | 1986/87 | 1987/88 |
|---|---|---|---|
| | $ | $ | $ |
| Australian | 10-36 | 10-60 | 11-10 |
| British Admiralty | 19-46 | 22-47 | 27-82 |
| New Zealand | 9-85 | 12-23 | 13-81 |
| Canadian | 7-26 | 7-26 | 7-26 |

# APPENDIX 5

## UNIFORMED AND CIVILIAN STAFFING LEVELS

### Uniformed

**A) Hydrographic Survey Specialists.**

The numbers of hydrographic specialists in the Hydrographic Service on 30 June 1988 were as follows. (Figures at 30 June 1987 in Brackets):

| Rank | Billets | Bearing |
|---|---|---|
| Commodore | 1 | 1 (0) |
| Captain | 1 | 1 (2) |
| Commander | 3 | 4 (4) |
| Lieutenant Commander | 9 | 8 (7) |
| Lieutenant | 16 | 20 (21) |
| Sub Lieutenant | 0 | 2 (3) |
| WOSR | 1 | 1 (1) |
| CPOSR | 5 | 6 (6) |
| POSR | 8 | 8 (9) |
| LSSR | 14 | 18 (17) |
| ABSR/SMSR | 33 | 37 (33) |
| Totals | 91 | 96 (103) |

**B) Meteorological and Oceanographic Specialists**

The numbers of Meteorological and Oceanographic (METOC) specialists on 30 June 1988 were as follows. (Figures at 30 June 1987 in brackets).

| Rank | Billets | Bearing |
|---|---|---|
| Captain | 0 | — (1) |
| Commander | 2 | 4 (4) |
| Lieutenant Commander | 6 | 6 (6) |
| Lieutenant | 4 | 7 (5) |
| SBLT | — | 1 (1) |
| WOM | 1 | 1 (1) |
| CPOM | 2 | 3 (3) |
| POM | 5 | 6 (5) |
| LSM | 12 | 13 (11) |
| ABM | 30 | 22 (25) |
| SMM | — | 10 (3) |
| Totals | 62 | 73 (65) |

### Civilian

The following civilian members were employed in the Hydrographic Service on 30 June 1988.

| | Establishment | Average Staffing Level | Manning (30-6-88) |
|---|---|---|---|
| Cartographic | 57 | 36 | 42 |
| Cartographic Trainee | 1 | 2 | 2 |
| System Support | 10 | 9 | 9 |
| Distribution | 13 | 11 | 9 |
| Administration | 7 | 7 | 7 |
| Survey Branch | 6 | 6 | 5 |
| Science Branch | 4 | 4 | 4 |
| Naval Defence Act | 2 | 2 | 2 |
| Totals | 100 | 77 | 80 |

## APPENDIX 6

## HYDROGRAPHIC SERVICE KEY PERSONNEL DIRECTORY

### Canberra

| | | |
|---|---|---|
| HYDROGRAPHER RAN. | Commodore John S. Compton AM RAN | 062-655009 |
| Staff Officer Hydrography. | LCDR Paul A. Spencer RAN | 062-652599 |
| Director Oceanography & Meteorology. | CMDR Kevin L. Hancock RAN | 062-655006 |
| Oceanographic Staff Officer. | LCDR Craig A. Low RAN | 02-9254873 |
| Commander Naval Weather Centre. | CMDR Phillip J. Mead RAN | 044-211268 |

### Operations — Sydney

| | | |
|---|---|---|
| DIRECTOR, HYDROGRAPHIC OFFICE. | Captain Joe Doyle AM RAN | 02-9254801 |
| Head, Operations and Surveying. | CMDR Phillip A. Hardy RAN | 02-9254804 |
| Staff Officer Operations. | LEUT Colin K. Ellis RAN | 02-9254817 |
| Survey Quality Control | LCDR Douglas C. Holliday RAN | 02-9254808 |
| Detached Survey Officer | LCDR Richard Ball RN | 02-9254813 |
| Equipment Officer | WO Kevin D. Slade | 02-9254812 |
| Tidal Officer | Mr. Bohdan Pillich | 02-9254872 |
| Head Science and Oceanography. | Mr. Ben Searle | 02-9254870 |
| Head Navigation Services. | LCDR Mark A. Bolger RANEM | 02-9254850 |
| Sailing Directions Officer. | Mr. Graeme McIntosh | 02-9254889 |
| Head Nautical Charting | Mr. Brian C. Leonard | 02-9254830 |
| Supervisor System Support. | Mr. Boyd Rowland | 02-9254854 |
| Supervisor Chart Maintenance. | Mr. Gary Milby | 02-9254820 |
| Manager, Information Services | Mr. Ian Kennedy | 02-9254853 |
| Supervisor, Issues and Sales. | Mr. Kevin Reid | 02-9254880 |

### Co-Ordination and Development — Sydney

| | | |
|---|---|---|
| DIRECTOR, CO-ORDINATION AND DEVELOPMENT. | Mr. Ken G. Burrows | 02-9254803 |
| Manager, Planning and Resources. | CMDR John W. Leech RAN | 02-9254802 |
| Staff Officer Plans. | LEUT Andrew J.F. Ahern RAN | 02-9254817 |
| Manager, Administrative Services. | Mr. Greg Clarke | 02-9254809 |
| Manager, ADP Projects. | Mr. Ron Furness | 02-9254844 |

## Operations — Canberra

| | | |
|---|---|---|
| DIRECTOR, OPERATIONS | Mr. Bruce Willington | 062-525169 |
| Head Administrative Services | Mr. David Griffin | 062-526592 |

## HYDROGRAPHIC SERVICE RAN — KEY ADDRESSES

Addresses as at 30 June 1988.

### SYDNEY

**RAN Hydrographic Office**
161 Walker Street
NORTH SYDNEY NSW 2059

P.O. Box 1332
NORTH SYDNEY NSW 2060

Switch: (02) 9254800

Telex: AUSHYD AA 72669

Fax: (02) 9254835

Signal: HYDRO SYD

### CANBERRA

**Office of the Hydrographer, RAN**
A-1-15 Russell Offices
Department of Defence (NAVY)
CANBERRA ACT 2600

Switch: (062) 652599

Telex: NAVY AA62112
(Attention: HYDRO RAN)

Fax: (062) 655050 FOR HYDRO RAN

Signal: HYDRO RAN

**Canberra Operations**
Unit 3GC
Cameron Offices
Cnr. Cameron Ave & Edmonds Place
BELCONNEN ACT 2616

Switch: (062) 527099

Fax: (062) 516806 FOR BATHYMETRIC UNIT

### FIELD UNITS

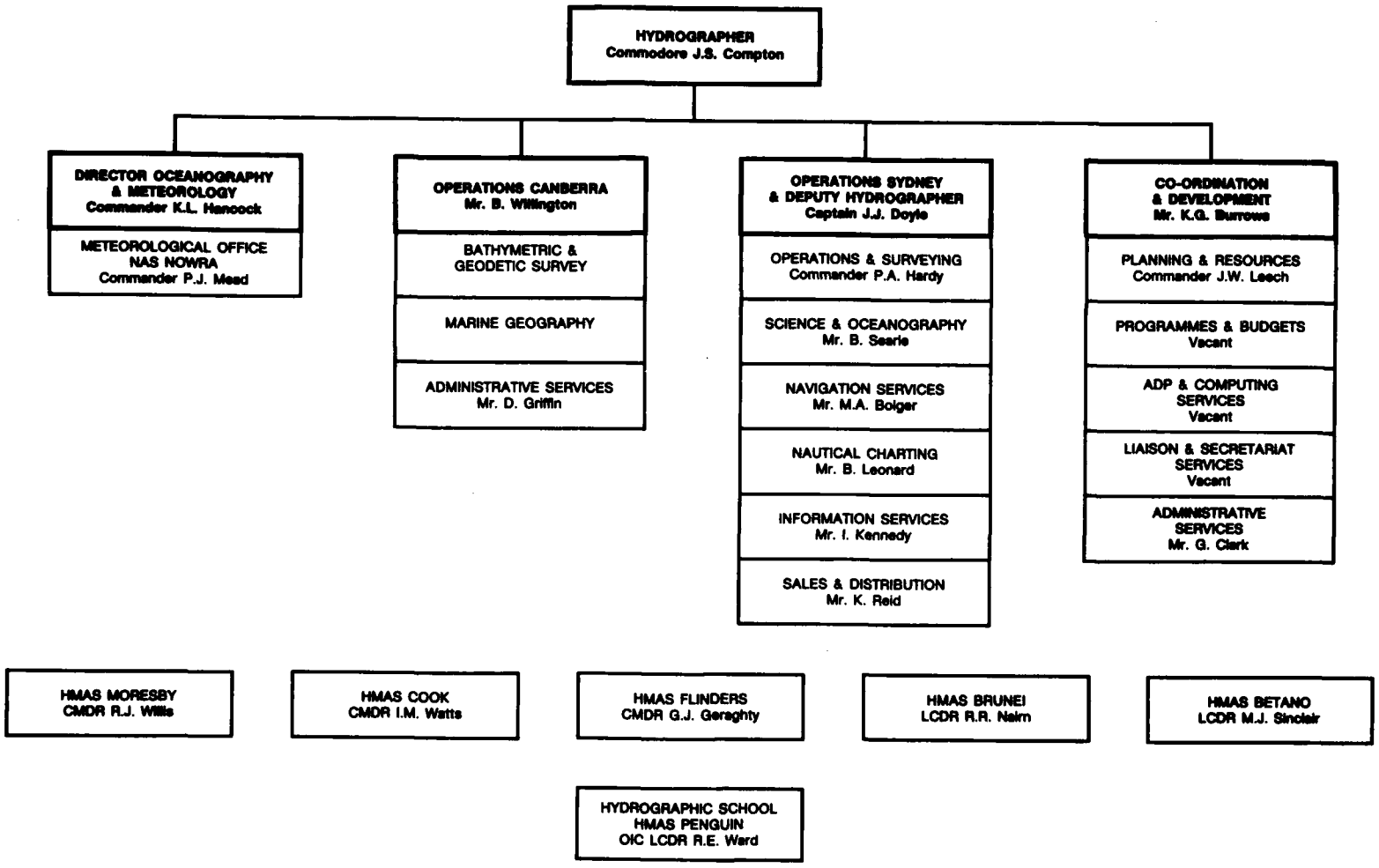
**Naval Weather Centre**
Naval Air Station
NOWRA NSW 2540
Phone: (044) 21-1269

**HMAS MORESBY**
C/-HMAS STIRLING
P.O. Box 228
ROCKINGHAM WA 6168
Phone: (095) 27-0470

**HMAS FLINDERS**
**HMAS BRUNEI**
**HMAS BETANO**
C/-HMAS CAIRNS
Draper Street
CAIRNS QLD 4870
PHONE: (070) 50-3311

**HMAS COOK**
C/-Warships
SYDNEY NSW 2890
Phone: (02) 359-9111

**RAN Hydrographic School**
HMAS PENGUIN
C/-Naval Post Office
BALMORAL NSW 2890
Phone: (02) 960-0264


HYDROGRAPHER
Commodore J.S. Compton
DIRECTOR OCEANOGRAPHY & METEOROLOGY
Commander K.L. Hancock
METEOROLOGICAL OFFICE NAS NOWRA
Commander P.J. Mead
OPERATIONS CANBERRA
Mr. B. Willington
BATHYMETRIC & GEODETIC SURVEY
MARINE GEOGRAPHY
ADMINISTRATIVE SERVICES
Mr. D. Griffin
OPERATIONS SYDNEY & DEPUTY HYDROGRAPHER
Captain J.J. Doyle
OPERATIONS & SURVEYING
Commander P.A. Hardy
SCIENCE & OCEANOGRAPHY
Mr. B. Searle
NAVIGATION SERVICES
Mr. M.A. Bolger
NAUTICAL CHARTING
Mr. B. Leonard
INFORMATION SERVICES
Mr. I. Kennedy
SALES & DISTRIBUTION
Mr. K. Reid
CO-ORDINATION & DEVELOPMENT
Mr. K.G. Burrows
PLANNING & RESOURCES
Commander J.W. Leech
PROGRAMMES & BUDGETS
Vacant
ADP & COMPUTING SERVICES
Vacant
LIAISON & SECRETARIAT SERVICES
Vacant
ADMINISTRATIVE SERVICES
Mr. G. Clark
HMAS MORESBY
CMDR R.J. Willis
HMAS COOK
CMDR I.M. Watts
HMAS FLINDERS
CMDR G.J. Geraghty
HMAS BRUNEI
LCDR R.R. Nairn
HMAS BETANO
LCDR M.J. Sinclair
HYDROGRAPHIC SCHOOL
HMAS PENGUIN
OIC LCDR R.E. Ward

# ILLUSTRATIONS

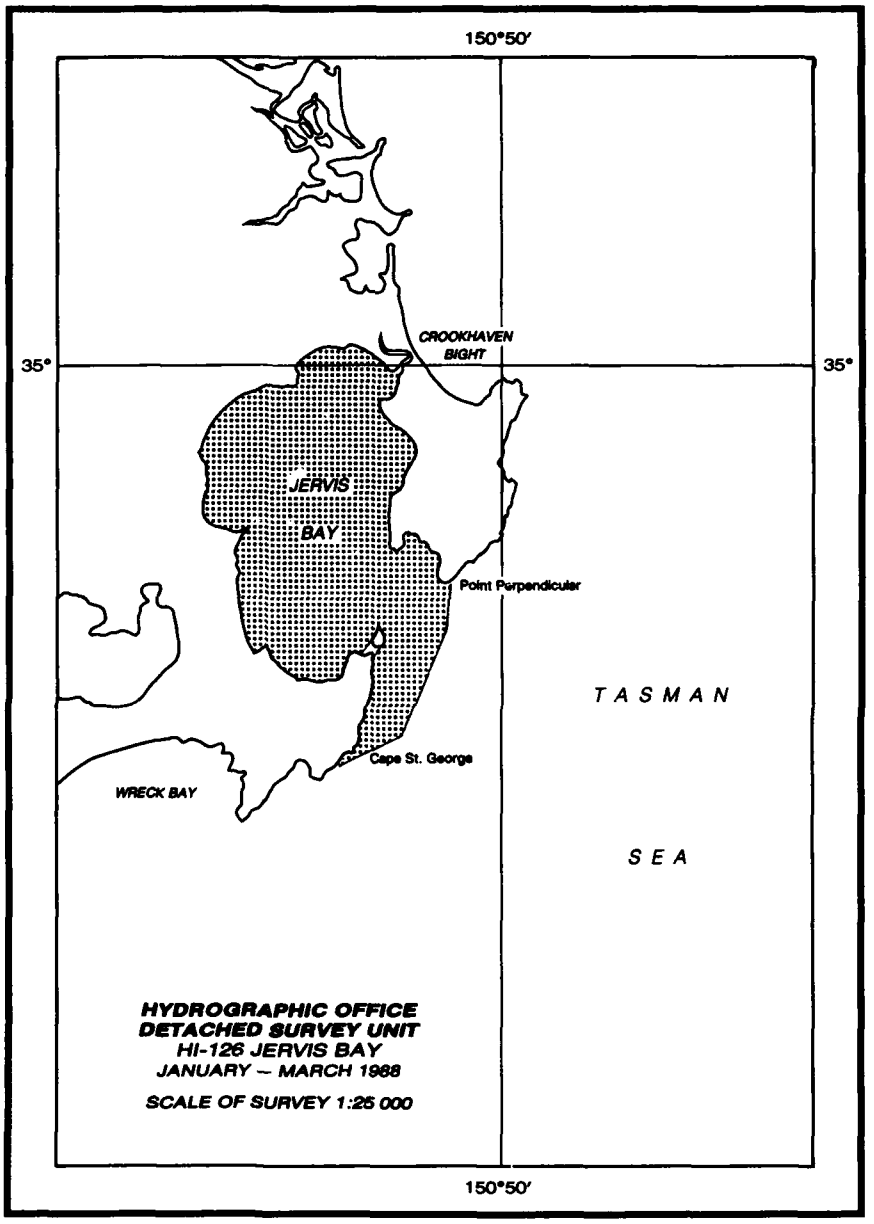

150°50′
35°
35°
CROOKHAVEN BIGHT
JERVIS BAY
Point Perpendicular
TASMAN SEA
Cape St. George
WRECK BAY
HYDROGRAPHIC OFFICE
DETACHED SURVEY UNIT
HI-126 JERVIS BAY
JANUARY – MARCH 1988
SCALE OF SURVEY 1:25 000
150°50′

FIG.1

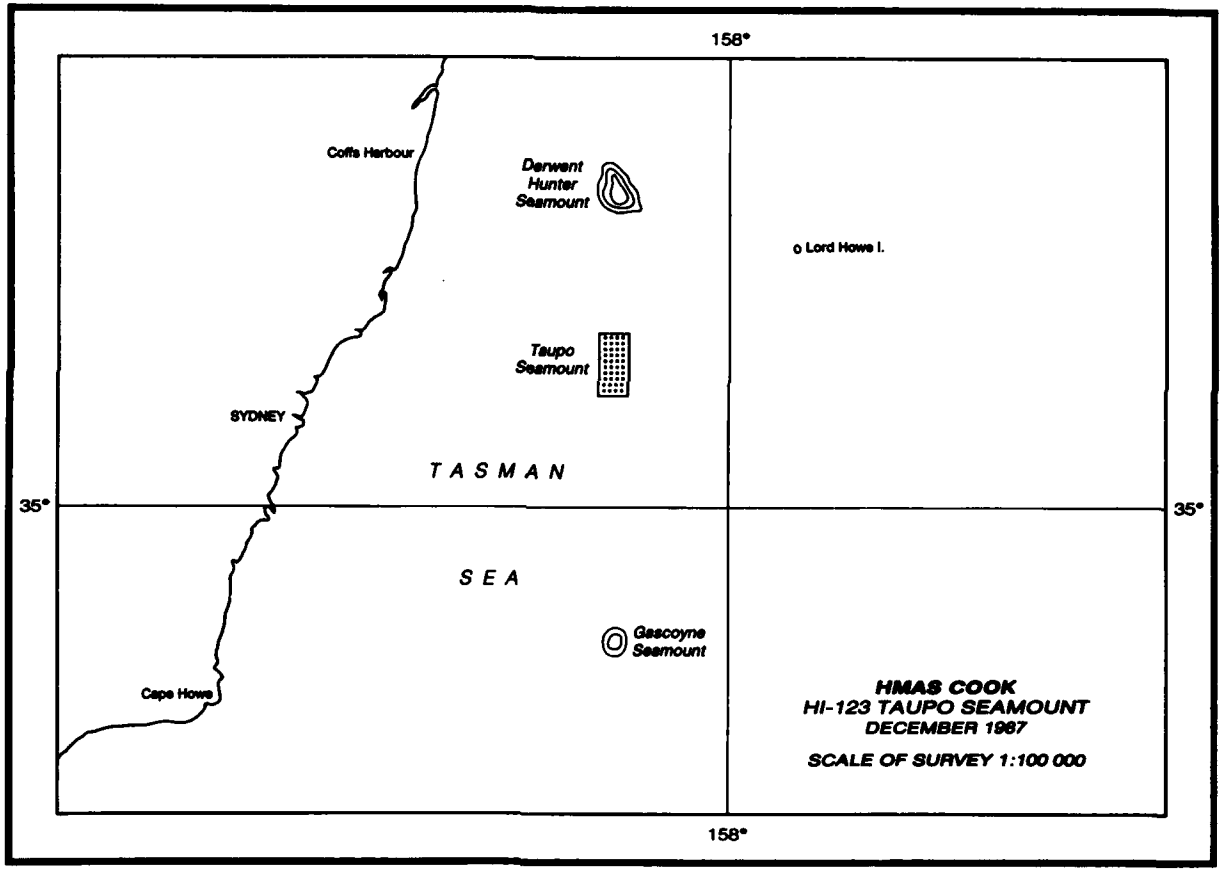

158°
Coffs Harbour
Derwent
Hunter
Seamount
o Lord Howe I.
Taupo
Seamount
SYDNEY
TASMAN
35°
35°
SEA
Gascoyne
Seamount
Cape Howe
HMAS COOK
HI-123 TAUPO SEAMOUNT
DECEMBER 1987
SCALE OF SURVEY 1:100 000
158°

FIG.2

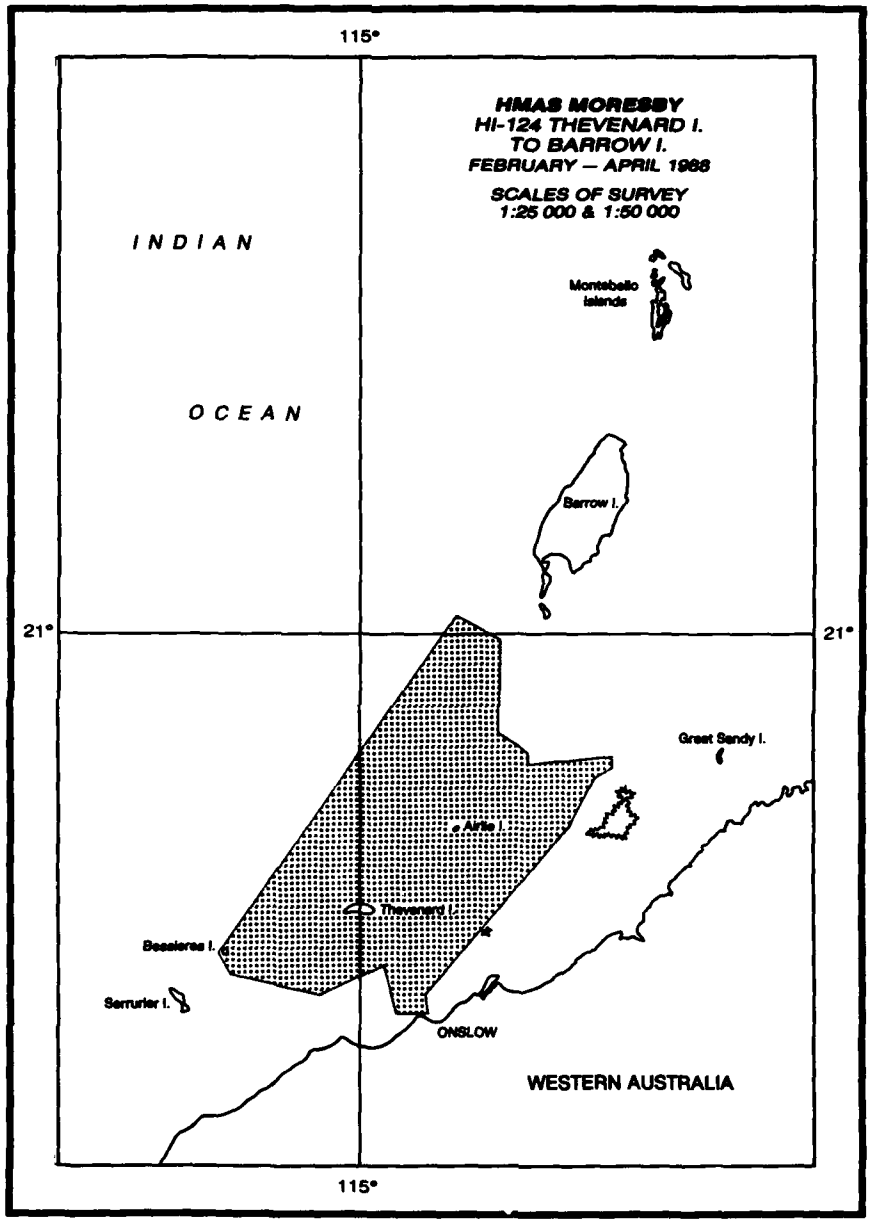

115°
HMAS MORESBY
HI-124 THEVENARD I.
TO BARROW I.
FEBRUARY – APRIL 1988
SCALES OF SURVEY
1:25 000 & 1:50 000
INDIAN
OCEAN
Montebello Islands
Barrow I.
21°
21°
Great Sandy I.
e Airlie I.
Thevenard I.
Bessieres I.
Serrurier I.
ONSLOW
WESTERN AUSTRALIA
115°

FIG.3

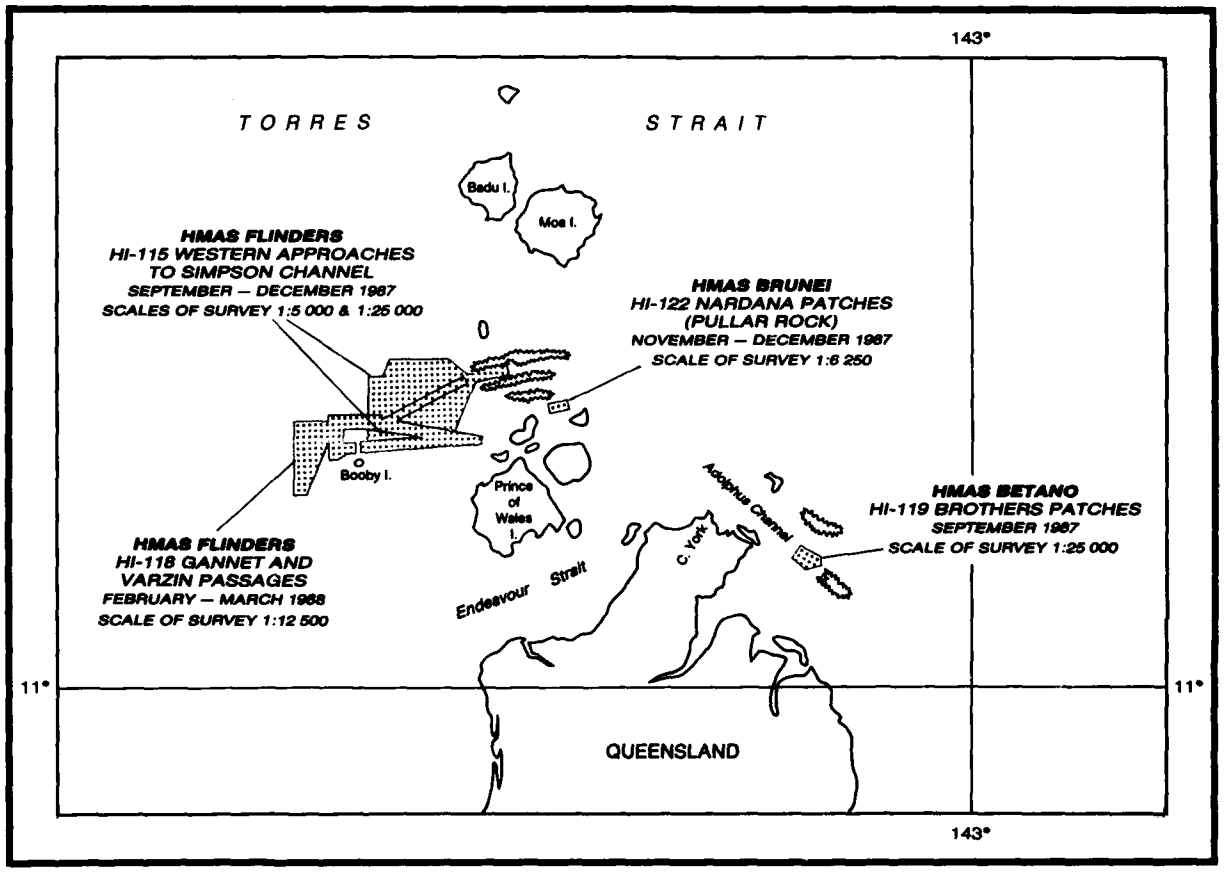

143°
TORRES STRAIT
Bedu I.
Moa I.
HMAS FLINDERS
HI-115 WESTERN APPROACHES
TO SIMPSON CHANNEL
SEPTEMBER – DECEMBER 1987
SCALES OF SURVEY 1:5 000 & 1:25 000
HMAS BRUNEI
HI-122 NARDANA PATCHES
(PULLAR ROCK)
NOVEMBER – DECEMBER 1987
SCALE OF SURVEY 1:6 250
Booby I.
Prince of Wales I.
HMAS FLINDERS
HI-118 GANNET AND
VARZIN PASSAGES
FEBRUARY – MARCH 1988
SCALE OF SURVEY 1:12 500
Endeavour Strait
Adolphus Channel
C. York
HMAS BETANO
HI-119 BROTHERS PATCHES
SEPTEMBER 1987
SCALE OF SURVEY 1:25 000
11°
QUEENSLAND
11°
143°

FIG.4

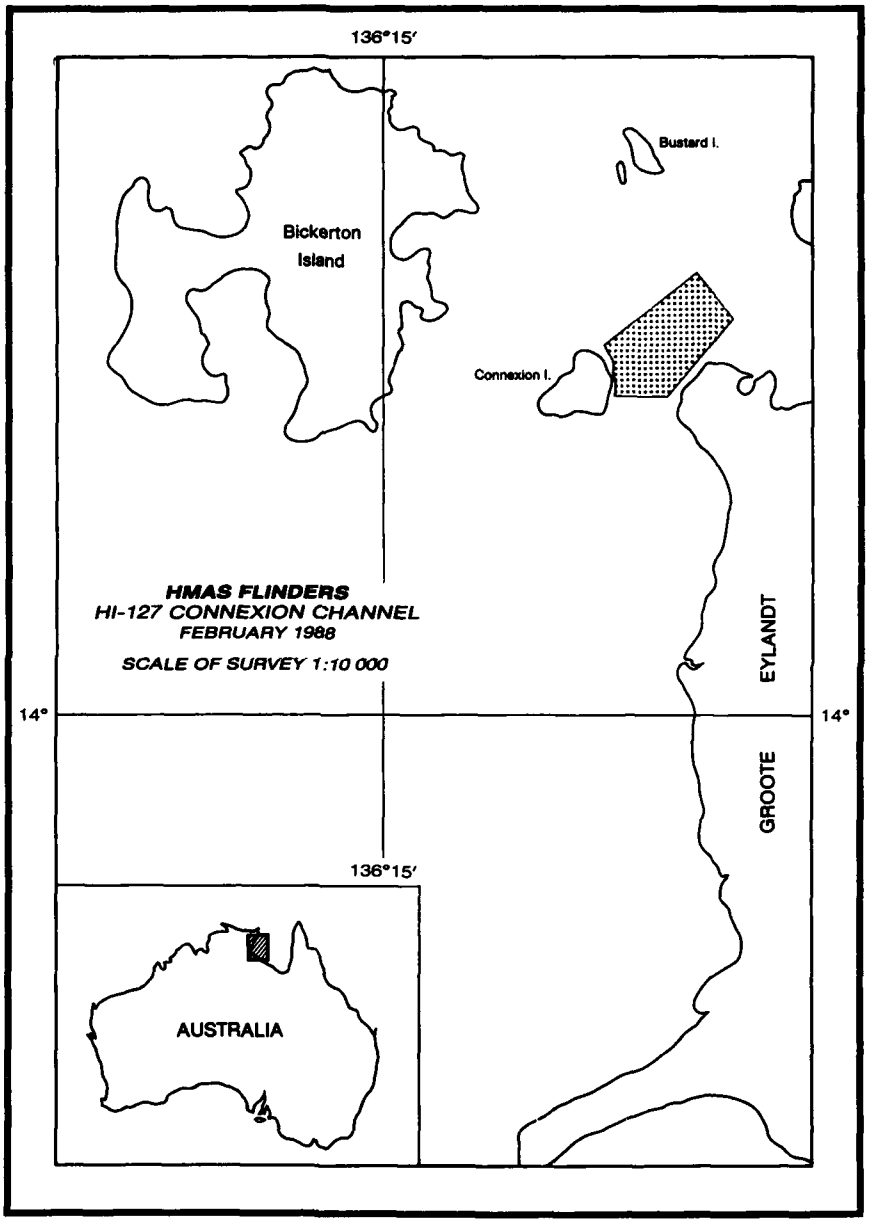

136°15′
Bustard I.
Bickerton
Island
Connexion I.
HMAS FLINDERS
HI-127 CONNEXION CHANNEL
FEBRUARY 1988
SCALE OF SURVEY 1:10 000
EYLANDT
14°
14°
GROOTE
136°15′
AUSTRALIA

FIG.5

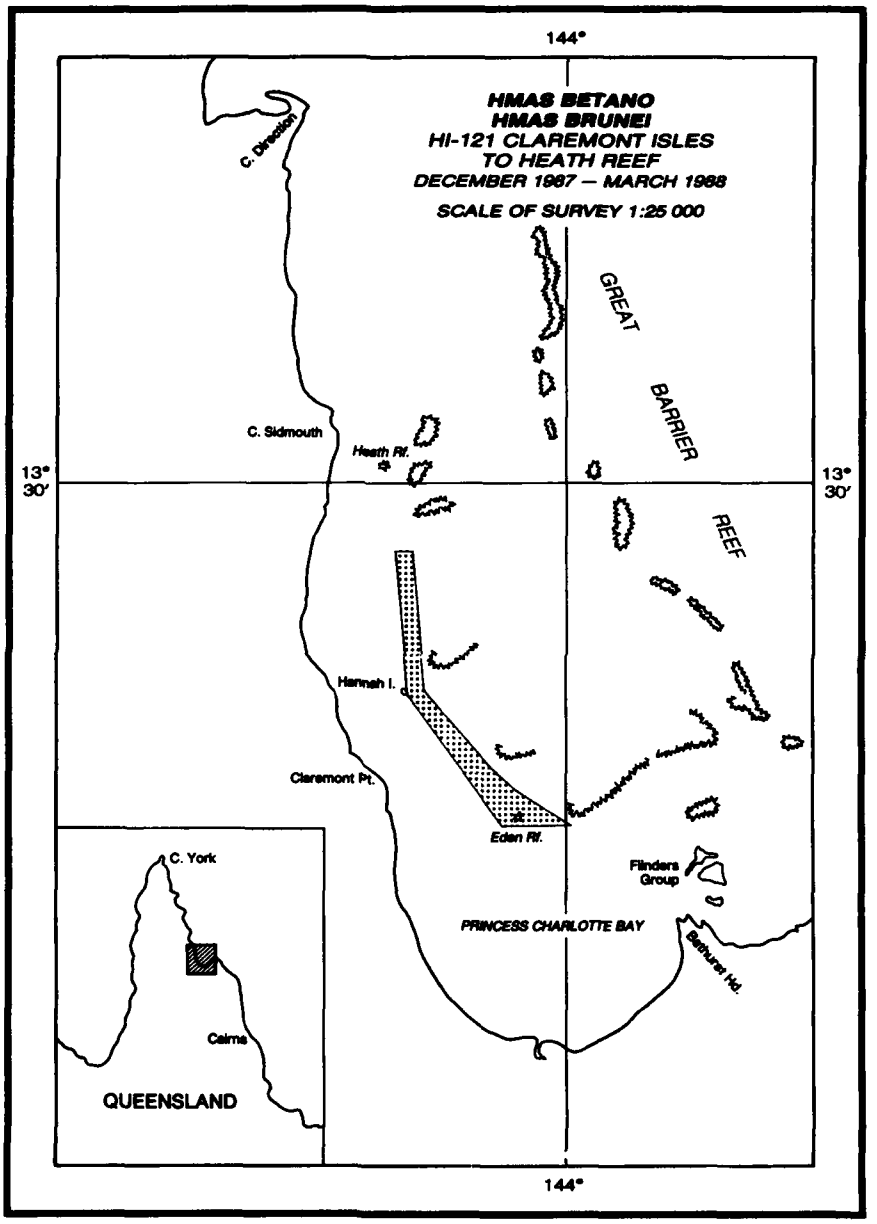

144°
HMAS BETANO
HMAS BRUNEI
HI-121 CLAREMONT ISLES
TO HEATH REEF
DECEMBER 1987 — MARCH 1988
SCALE OF SURVEY 1:25 000
C. Direction
GREAT
BARRIER
REEF
C. Sidmouth
Heath Rf.
13° 30′
13° 30′
Hannah I.
Claremont Pt.
Eden Rf.
Flinders Group
PRINCESS CHARLOTTE BAY
Bathurst Hd.
C. York
Cairns
QUEENSLAND
144°

FIG. 6

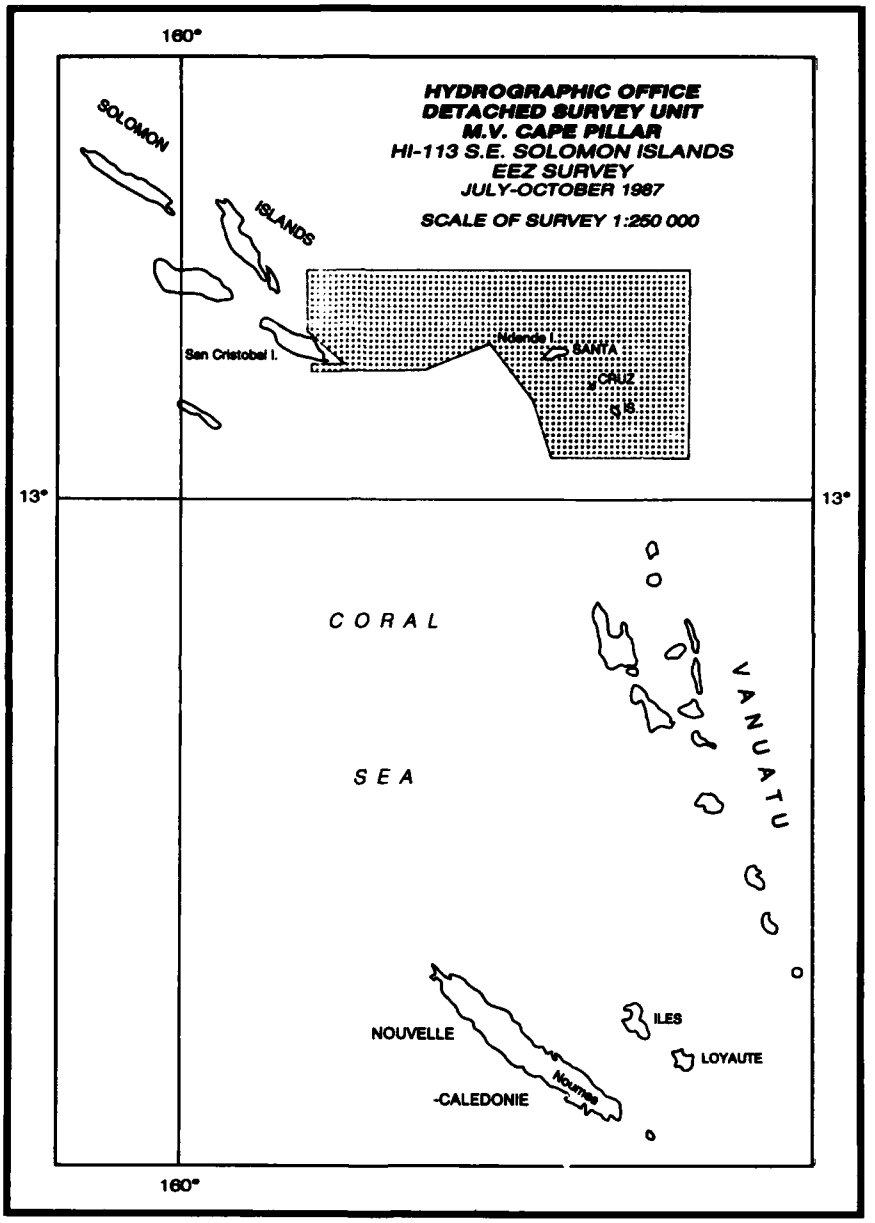

160°
HYDROGRAPHIC OFFICE
DETACHED SURVEY UNIT
M.V. CAPE PILLAR
HI-113 S.E. SOLOMON ISLANDS
EEZ SURVEY
JULY-OCTOBER 1987
SCALE OF SURVEY 1:250 000
SOLOMON
ISLANDS
San Cristobal I.
Ndende I.
SANTA
CRUZ
Is
13°
13°
CORAL
SEA
VANUATU
NOUVELLE
-CALEDONIE
Noumea
ILES
LOYAUTE
160°

FIG.7

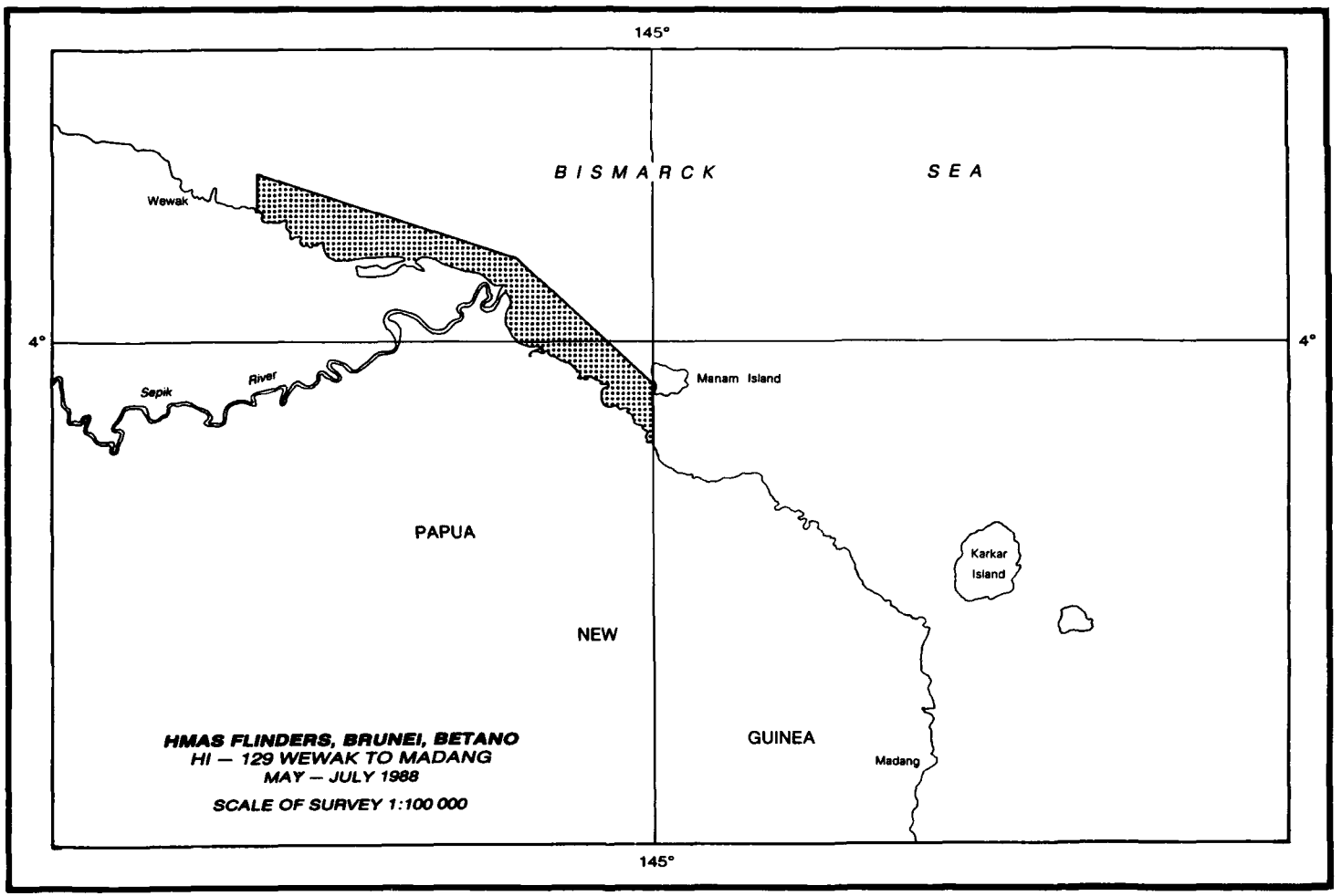

145°
BISMARCK SEA
Wewak
4°
Sepik River
Manam Island
PAPUA NEW GUINEA
Karkar Island
Madang
HMAS FLINDERS, BRUNEI, BETANO
HI — 129 WEWAK TO MADANG
MAY — JULY 1988
SCALE OF SURVEY 1:100 000
145°

FIG.8

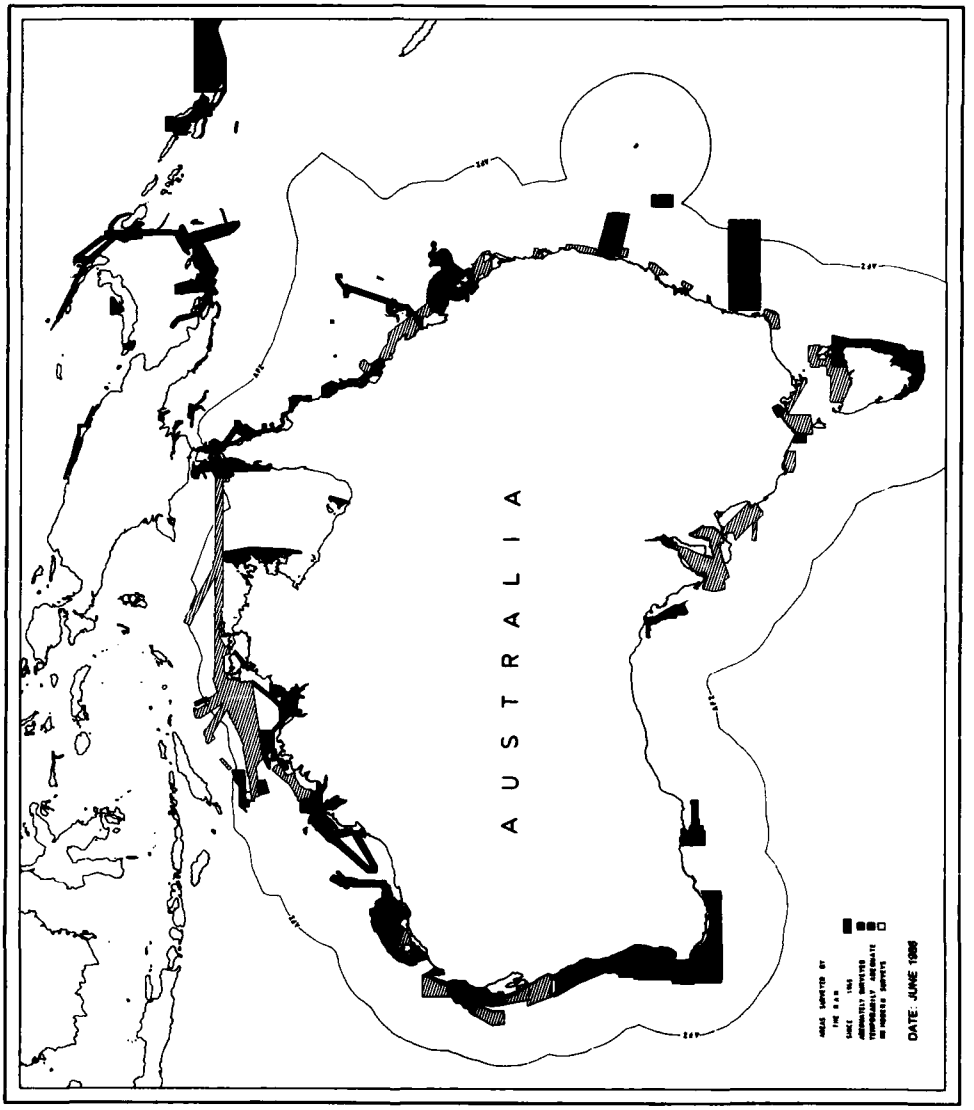
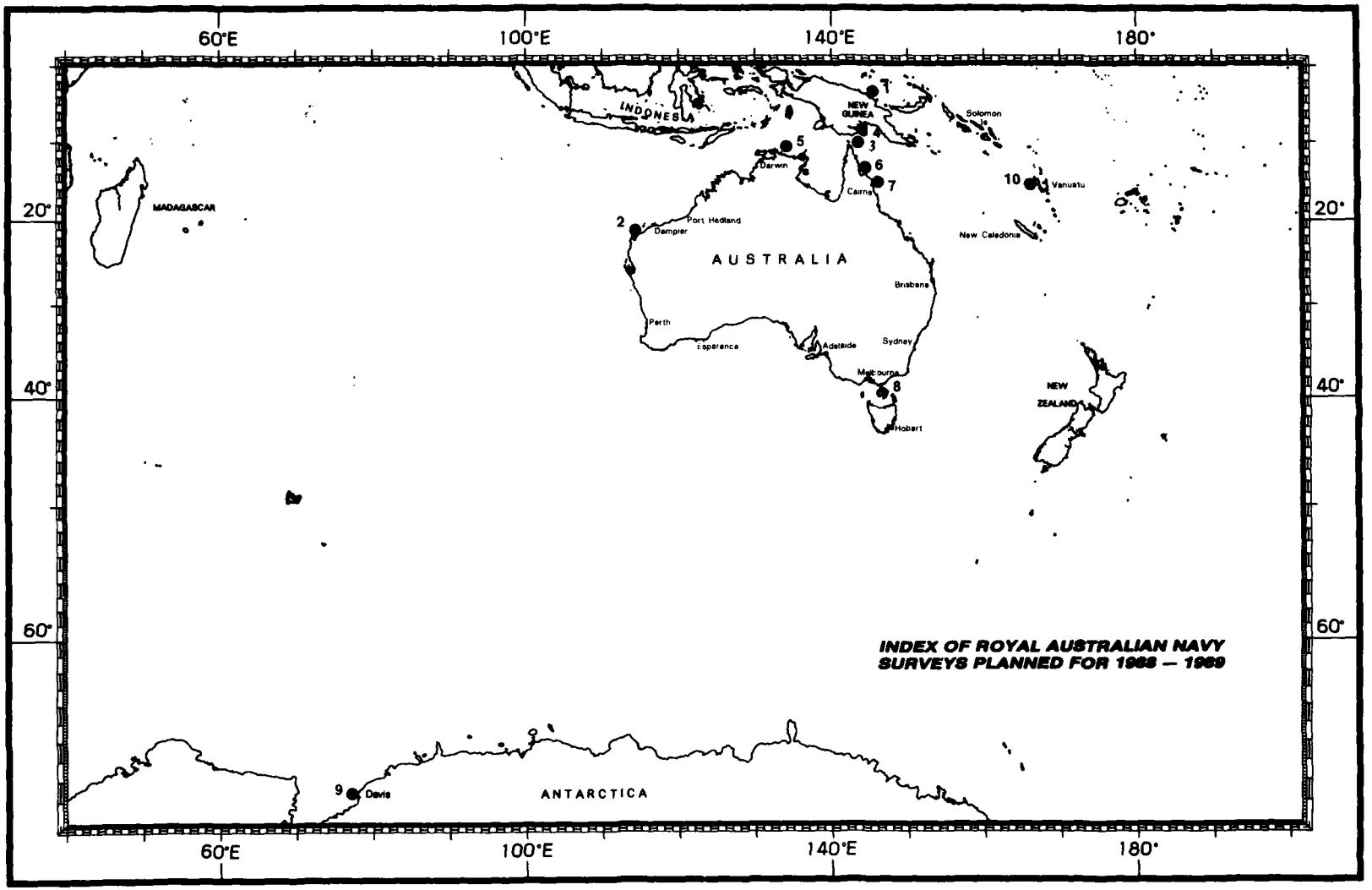



FIG.9


60°E
100°E
140°E
180°
20°
40°
60°
INDONESIA
NEW GUINEA
Solomon Is
Darwin
Cairns
Vanuatu
New Caledonia
MADAGASCAR
Dampier
Port Hedland
AUSTRALIA
Brisbane
Perth
Esperance
Adelaide
Sydney
Melbourne
Hobart
NEW ZEALAND
1
2
3
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9 Davis
10
ANTARCTICA
INDEX OF ROYAL AUSTRALIAN NAVY
SURVEYS PLANNED FOR 1988 — 1989

FIG.10

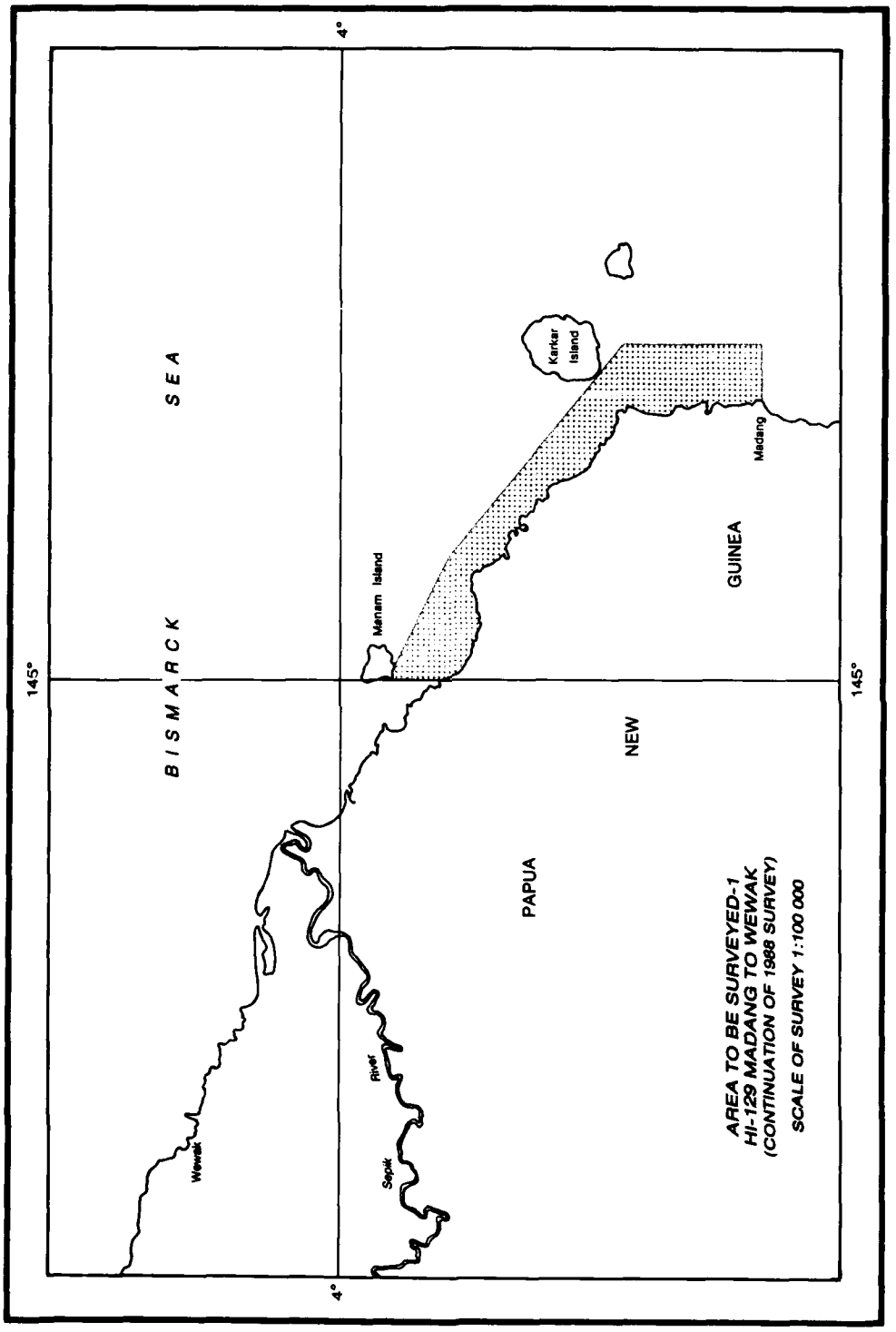

4°
145°
145°
4°
BISMARCK SEA
Kerkar Island
Manam Island
Madang
GUINEA
NEW
PAPUA
Wewak
Sepik River
AREA TO BE SURVEYED-1
HI-129 MADANG TO WEWAK
(CONTINUATION OF 1988 SURVEY)
SCALE OF SURVEY 1:100 000

FIG.11

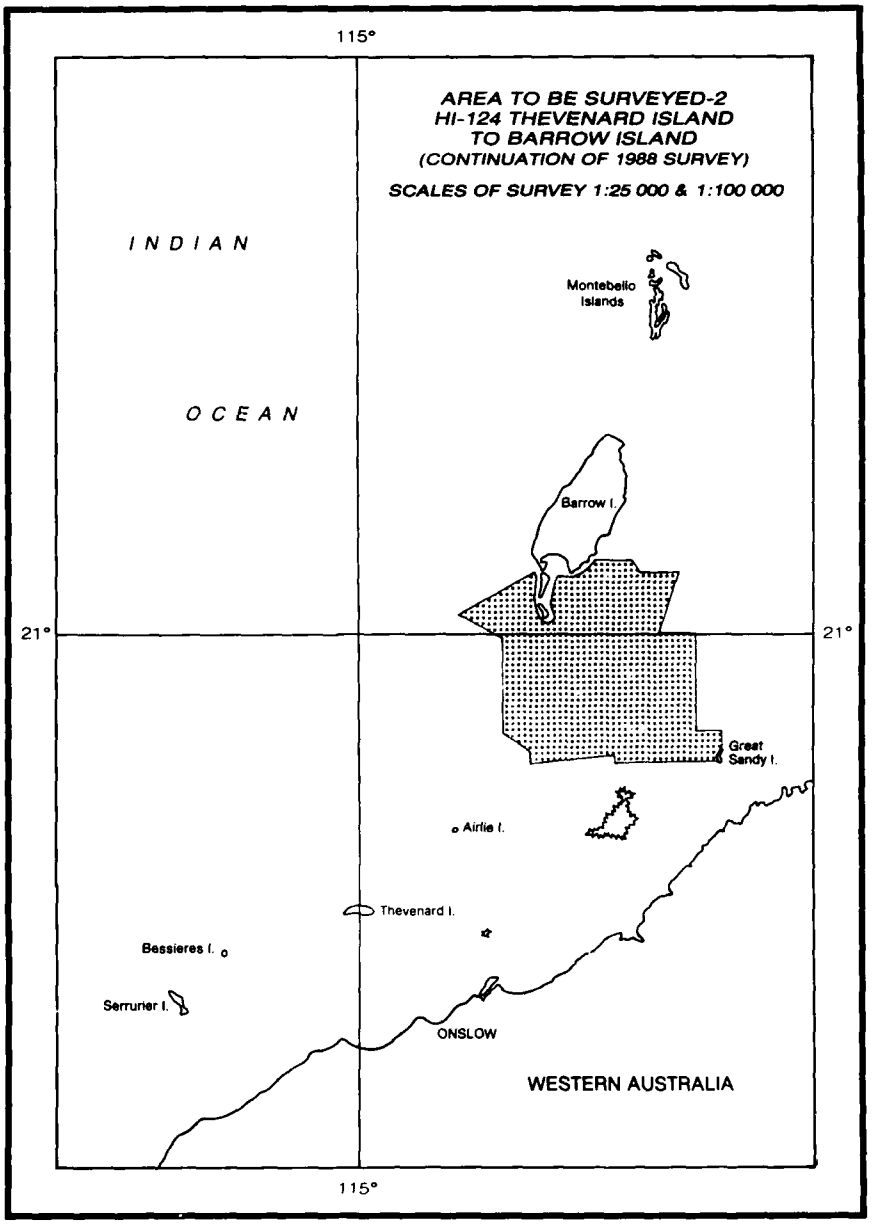

115°
AREA TO BE SURVEYED-2
HI-124 THEVENARD ISLAND
TO BARROW ISLAND
(CONTINUATION OF 1988 SURVEY)
SCALES OF SURVEY 1:25 000 & 1:100 000
INDIAN
OCEAN
Montebello Islands
Barrow I.
21°
21°
Great Sandy I.
Airlie I.
Thevenard I.
Bessieres I.
Serrurier I.
ONSLOW
WESTERN AUSTRALIA
115°

FIG.12

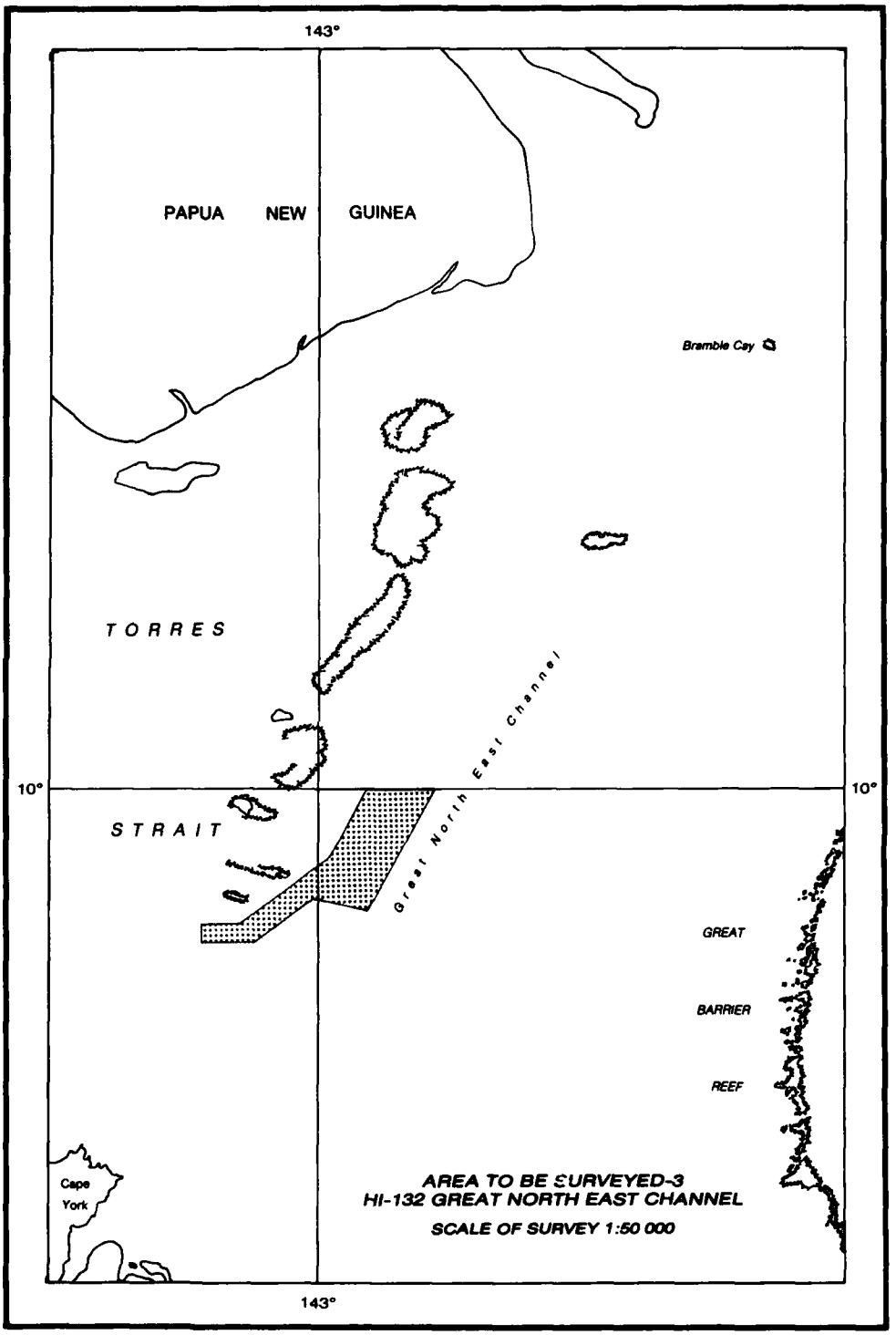

143°
PAPUA NEW GUINEA
Bramble Cay
TORRES
STRAIT
Great North East Channel
10°
10°
GREAT
BARRIER
REEF
Cape
York
AREA TO BE SURVEYED-3
HI-132 GREAT NORTH EAST CHANNEL
SCALE OF SURVEY 1:50 000
143°

FIG.13

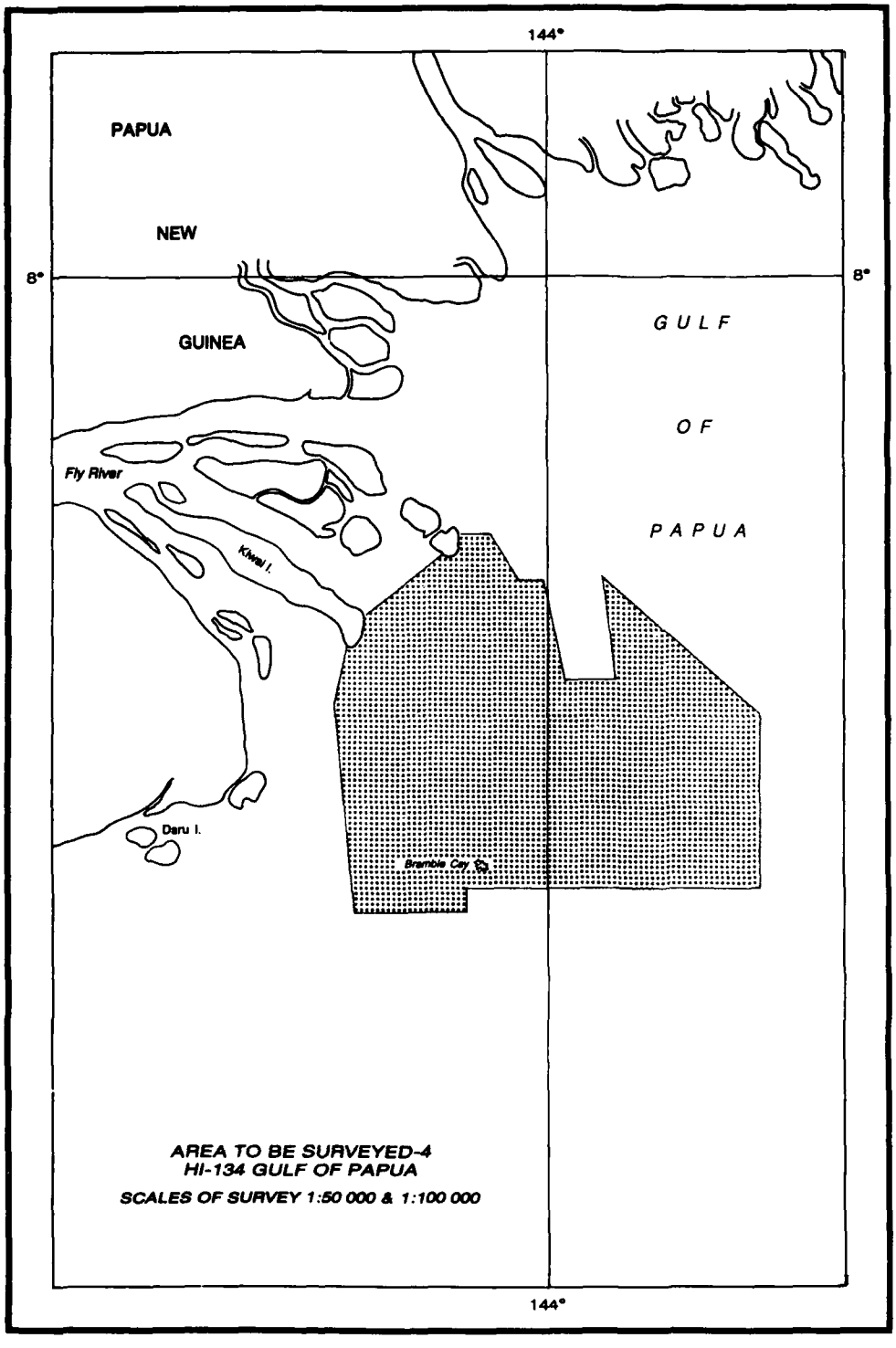

144°
PAPUA
NEW
GUINEA
8°
8°
GULF
OF
PAPUA
Fly River
Kiwai I.
Daru I.
Bramble Cay
AREA TO BE SURVEYED-4
HI-134 GULF OF PAPUA
SCALES OF SURVEY 1:50 000 & 1:100 000
144°

FIG.14

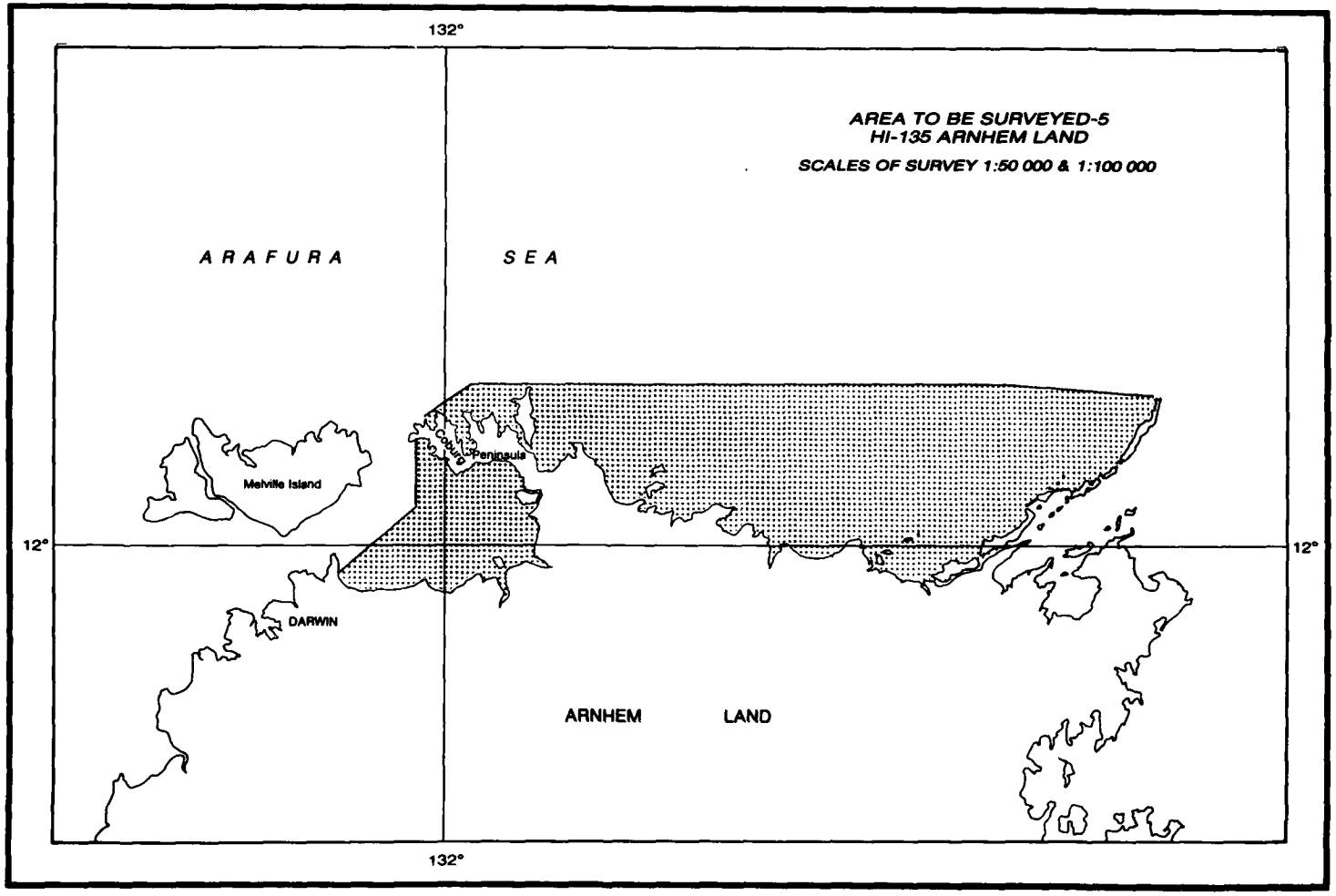

132°
AREA TO BE SURVEYED-5
HI-135 ARNHEM LAND
SCALES OF SURVEY 1:50 000 & 1:100 000
ARAFURA
SEA
Melville Island
Cobourg Peninsula
12°
12°
DARWIN
ARNHEM
LAND
132°

FIG.15

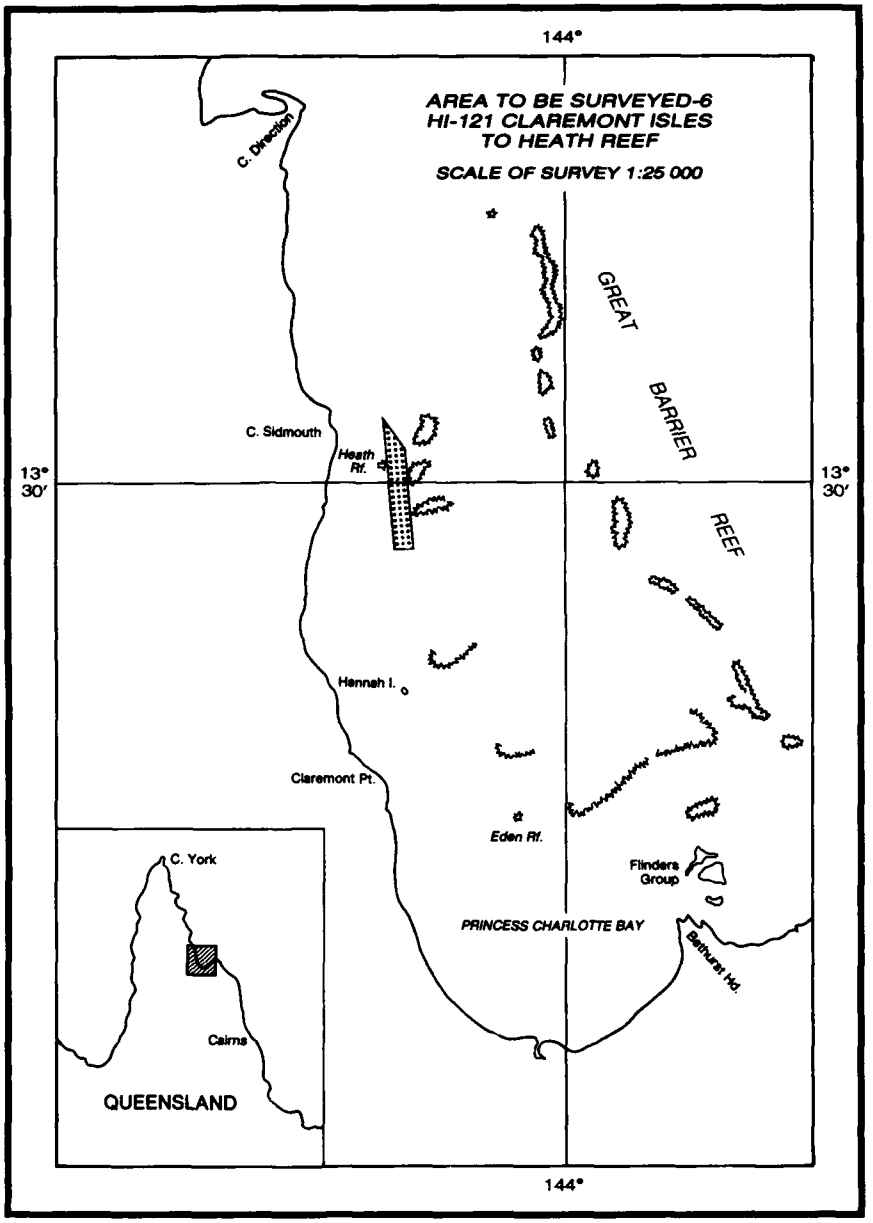

144°
AREA TO BE SURVEYED-6
HI-121 CLAREMONT ISLES
TO HEATH REEF
SCALE OF SURVEY 1:25 000
C. Direction
GREAT
BARRIER
REEF
C. Sidmouth
Heath Rf.
13° 30′
13° 30′
Hannah I.
Claremont Pt.
Eden Rf.
Flinders Group
PRINCESS CHARLOTTE BAY
Bathurst Hd.
C. York
Cairns
QUEENSLAND
144°

FIG.16

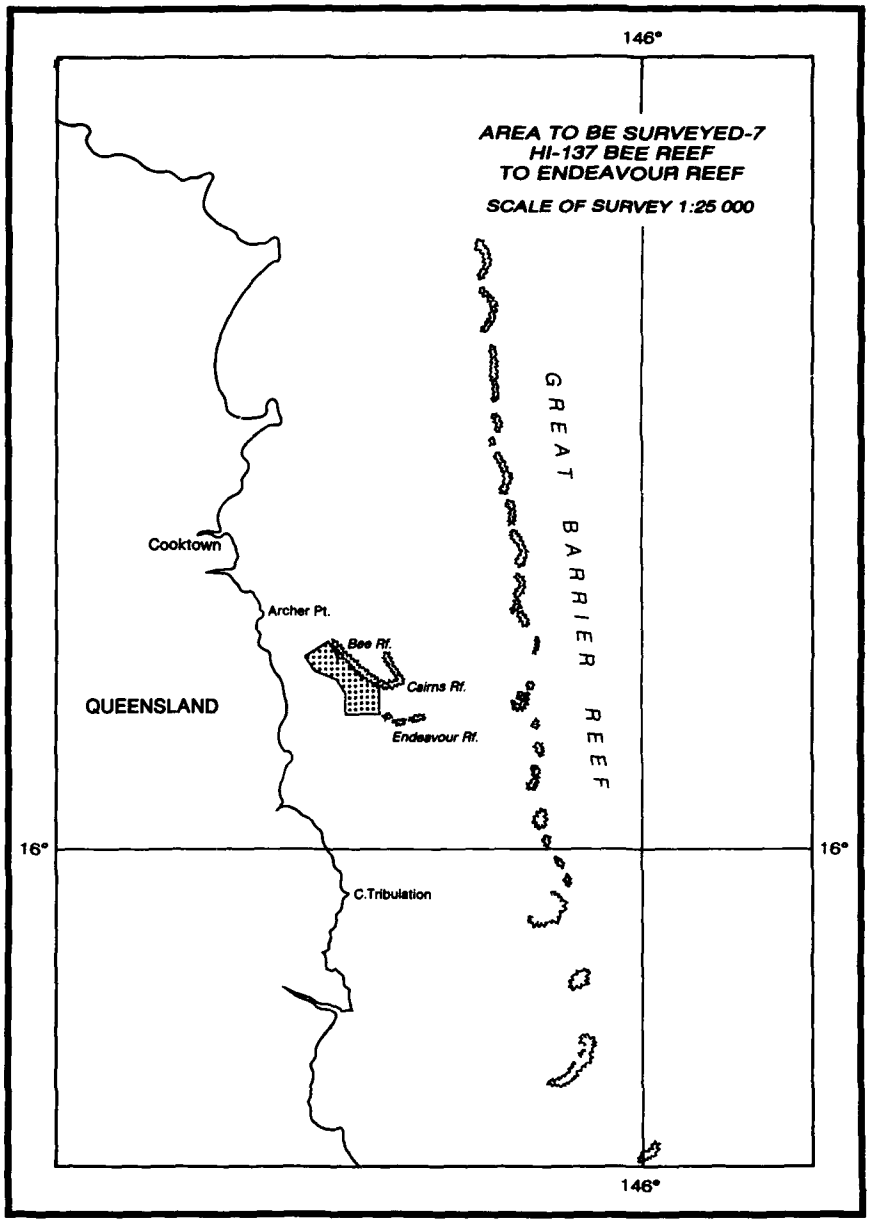

146°
AREA TO BE SURVEYED-7
HI-137 BEE REEF
TO ENDEAVOUR REEF
SCALE OF SURVEY 1:25 000
GREAT BARRIER REEF
Cooktown
Archer Pt.
Bee Rf.
Cairns Rf.
Endeavour Rf.
QUEENSLAND
16°
C.Tribulation
146°

FIG.17

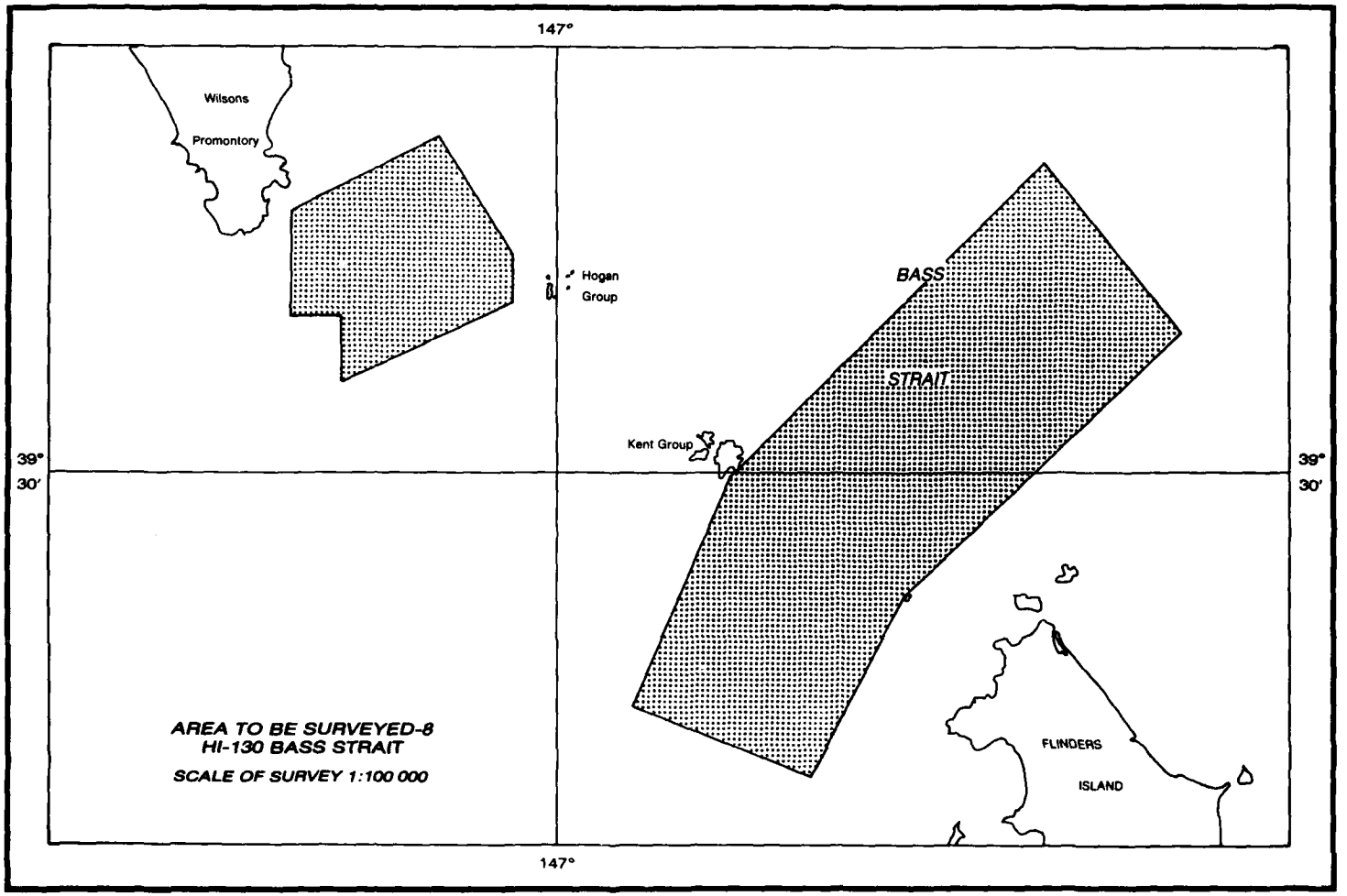

147°
Wilsons
Promontory
Hogan
Group
BASS
STRAIT
Kent Group
39°
30′
39°
30′
AREA TO BE SURVEYED-8
HI-130 BASS STRAIT
SCALE OF SURVEY 1:100 000
FLINDERS
ISLAND
147°

FIG.18

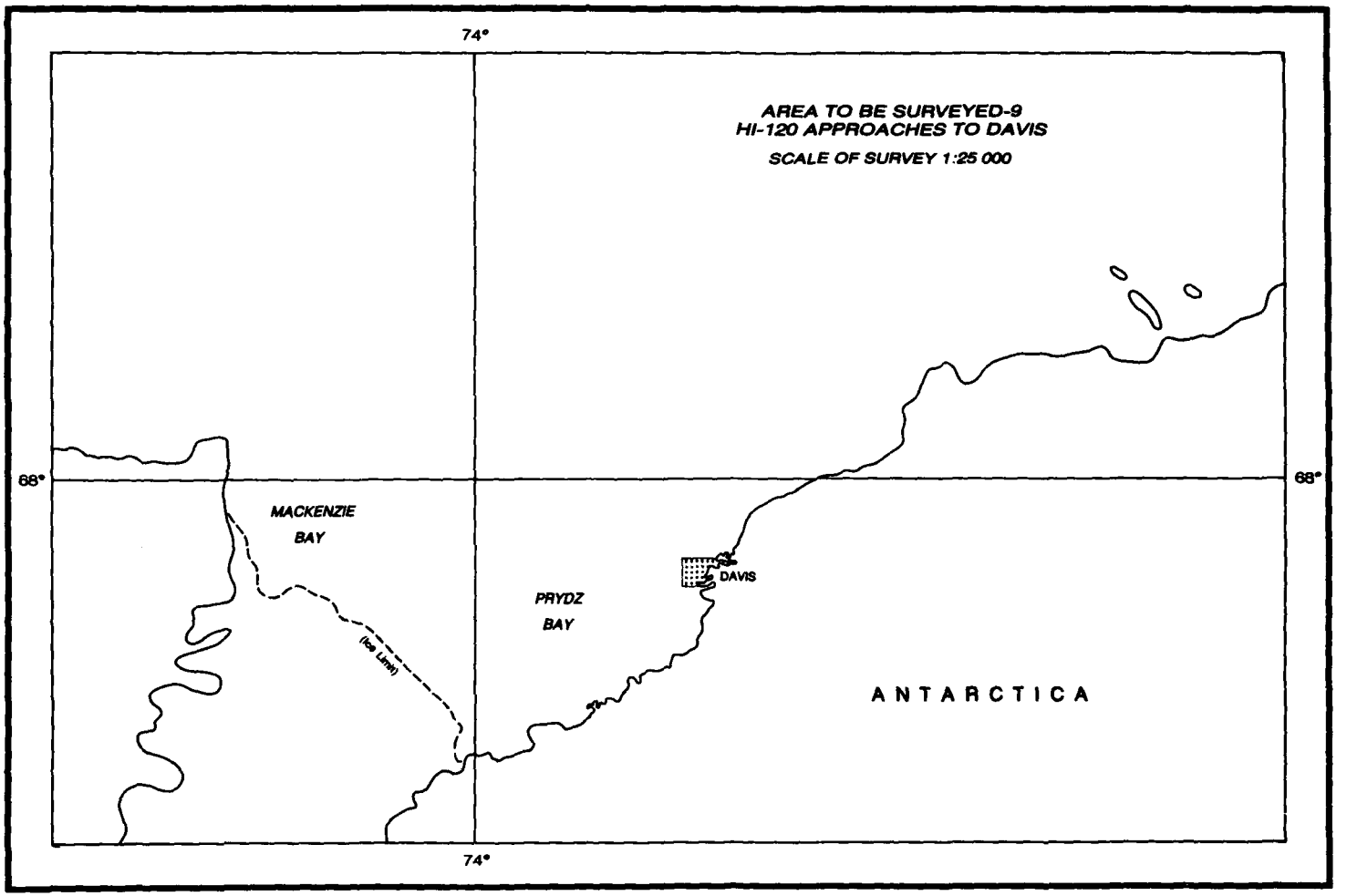

74°
AREA TO BE SURVEYED-9
HI-120 APPROACHES TO DAVIS
SCALE OF SURVEY 1:25 000
68°
68°
MACKENZIE
BAY
PRYDZ
BAY
DAVIS
(Ice Limit)
ANTARCTICA
74°

FIG.19

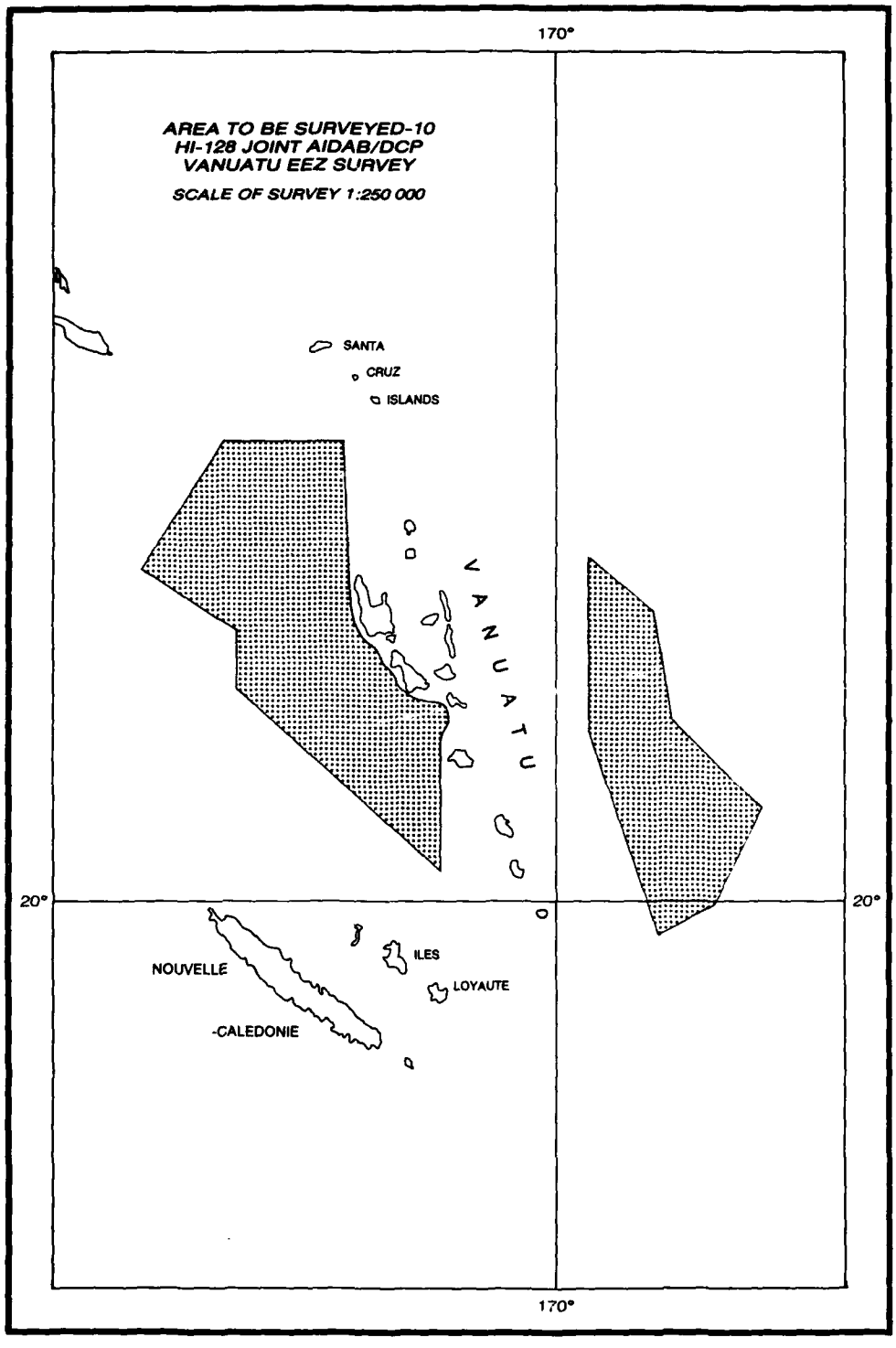

170°
AREA TO BE SURVEYED-10
HI-128 JOINT AIDAB/DCP
VANUATU EEZ SURVEY
SCALE OF SURVEY 1:250 000
SANTA
CRUZ
ISLANDS
VANUATU
20°
20°
ILES
LOYAUTE
NOUVELLE
-CALEDONIE
170°

FIG.20

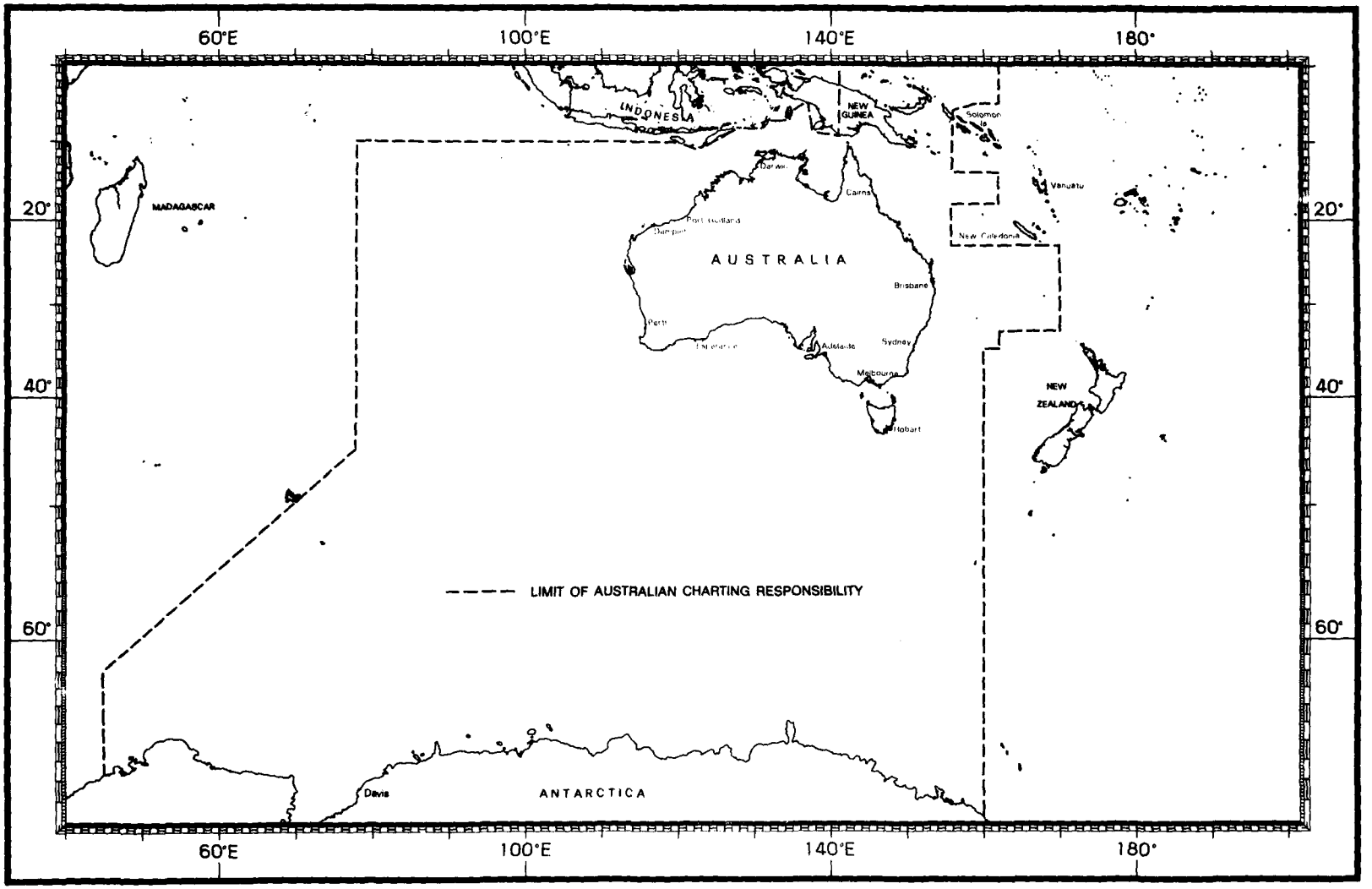
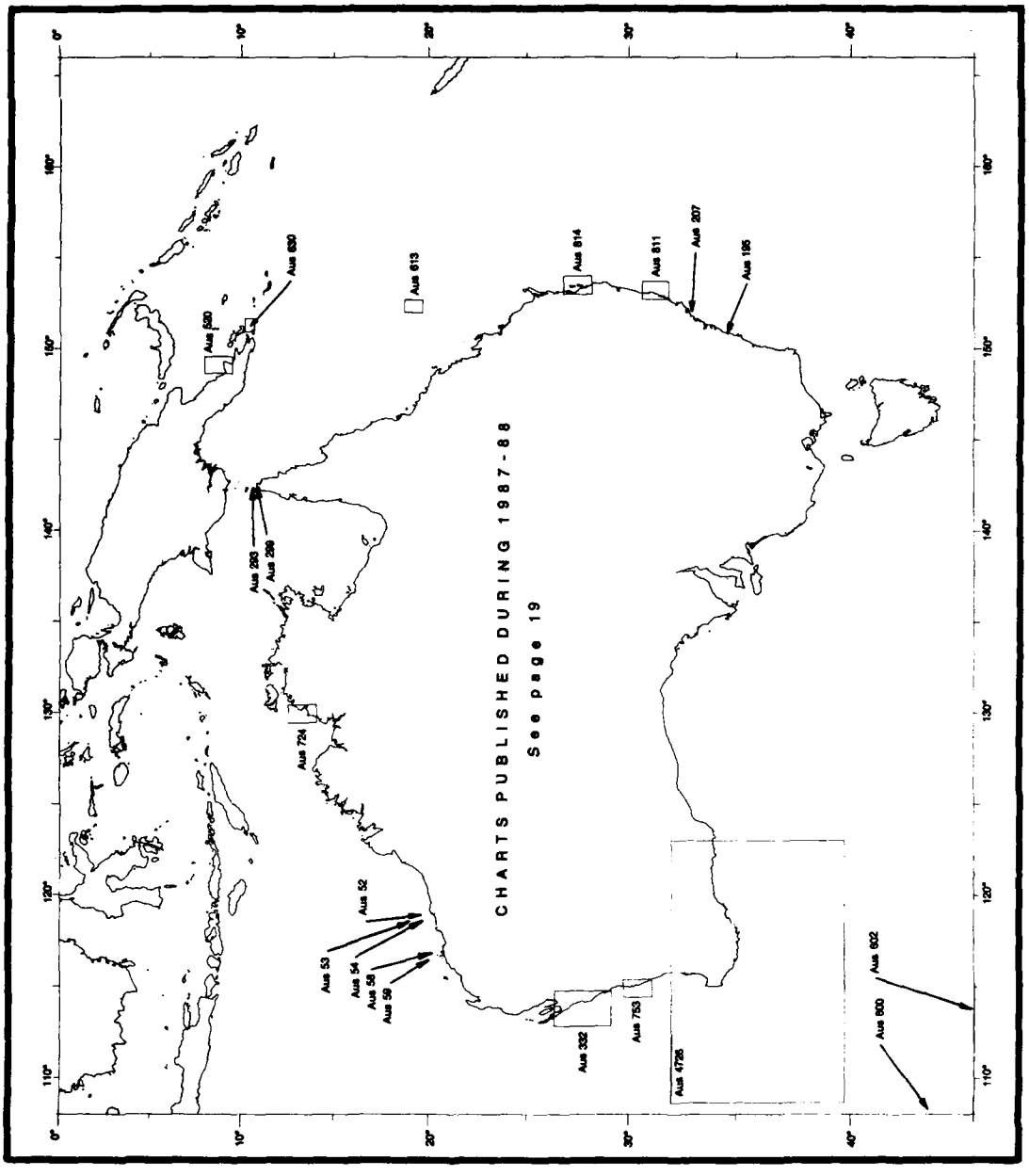

60°E
100°E
140°E
180°
20°
40°
60°
INDONESIA
NEW GUINEA
Solomon Is
Vanuatu
New Caledonia
MADAGASCAR
Darwin
Cairns
Port Hedland
Perth
AUSTRALIA
Brisbane
Adelaide
Sydney
Melbourne
Hobart
NEW ZEALAND
LIMIT OF AUSTRALIAN CHARTING RESPONSIBILITY
Davis
ANTARCTICA

FIG.21


CHARTS PUBLISHED DURING 1987-88
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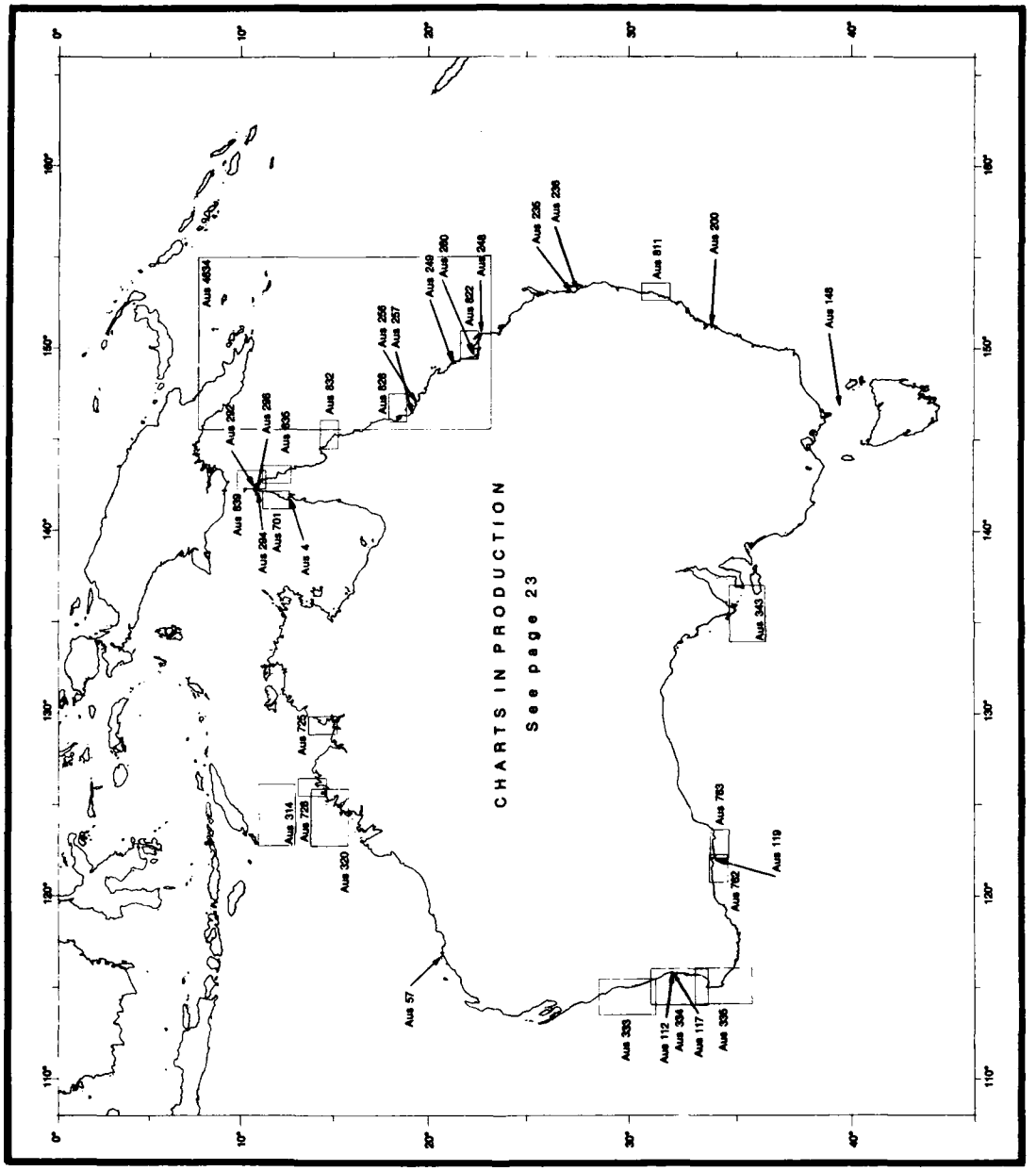
Aus 296
Aus 724
Aus 332
Aus 753
Aus 4726
Aus 800
Aus 802
Aus 820
Aus 830
Aus 613
Aus 814
Aus 811
Aus 207
Aus 195

FIG.22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See page 23
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Aus 835
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Aus 256
Aus 257
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Aus 280
Aus 248
Aus 822
Aus 235
Aus 236
Aus 811
Aus 200
Aus 148
Aus 839
Aus 284
Aus 701
Aus 4
Aus 343
Aus 725
Aus 314
Aus 728
Aus 320
Aus 57
Aus 783
Aus 782
Aus 119
Aus 333
Aus 112
Aus 334
Aus 117
Aus 335
0°
10°
20°
30°
40°
110°
120°
130°
140°
150°
160°

FIG.23

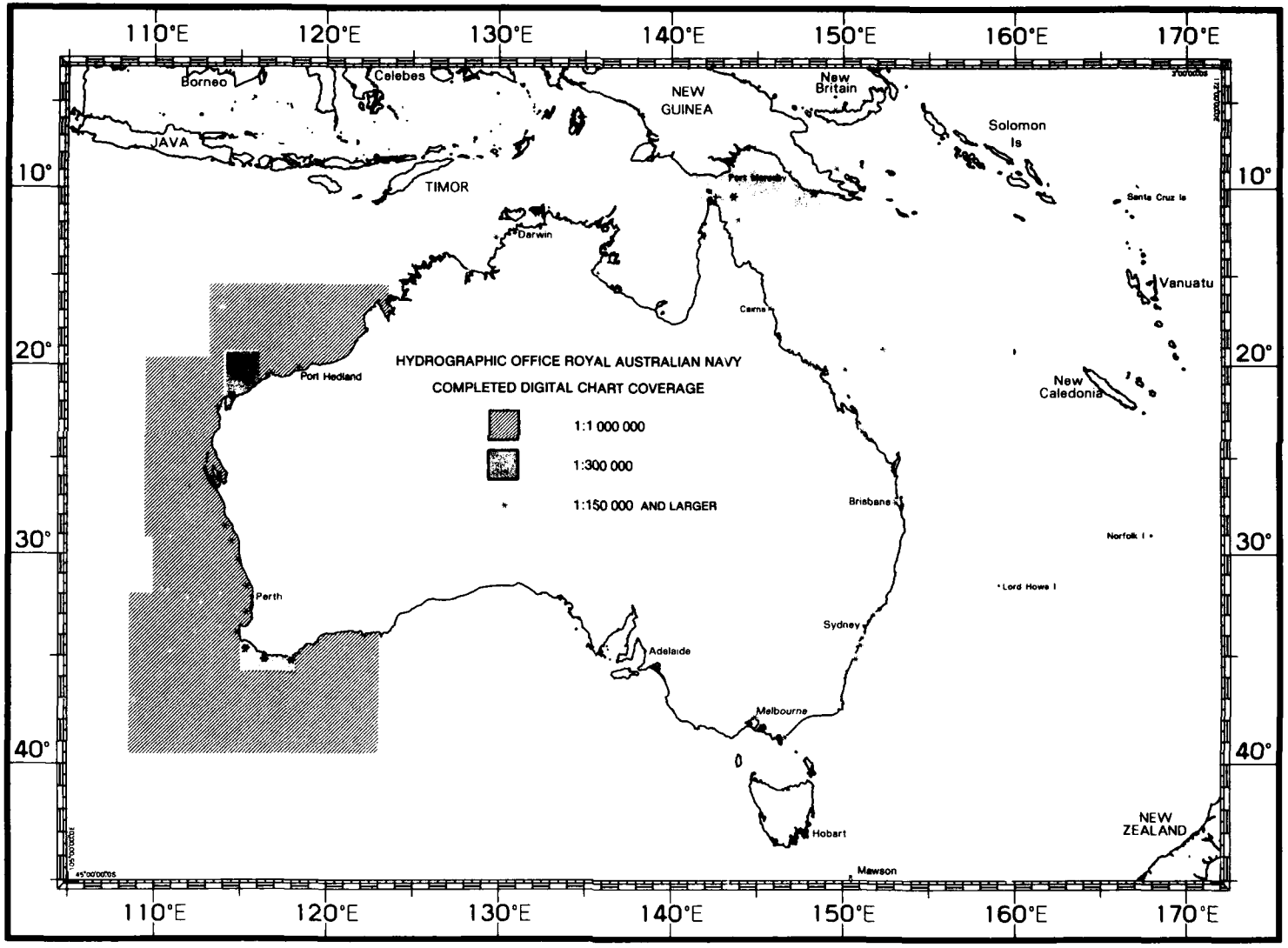
110°E
120°E
130°E
140°E
150°E
160°E
170°E
10°
20°
30°
40°
Borneo
Celebes
NEW GUINEA
New Britain
Solomon Is
JAVA
TIMOR
Port Moresby
Santa Cruz Is
Darwin
Vanuatu
Cairns
HYDROGRAPHIC OFFICE ROYAL AUSTRALIAN NAVY
COMPLETED DIGITAL CHART COVERAGE
1:1 000 000
1:300 000
1:150 000 AND LARGER
Port Hedland
New Caledonia
Brisbane
Norfolk I.
Lord Howe I.
Perth
Sydney
Adelaide
Melbourne
Hobart
NEW ZEALAND
Mawson

FIG.24

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Naval Officer Commanding, West Australia Area.
Naval Officer Commanding, Victoria Area.
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Rockhampton Harbour Board.
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NSW

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VIC

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TAS

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Marine Board of Circular Head.
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SA

Department of Marine and Harbours, Adelaide.

WA

Department of Marine and Harbours, Western Australia.
Albany Port Authority.
Bunbury Port Authority.
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